SEPTEMBER, 1960

Plant Engineering

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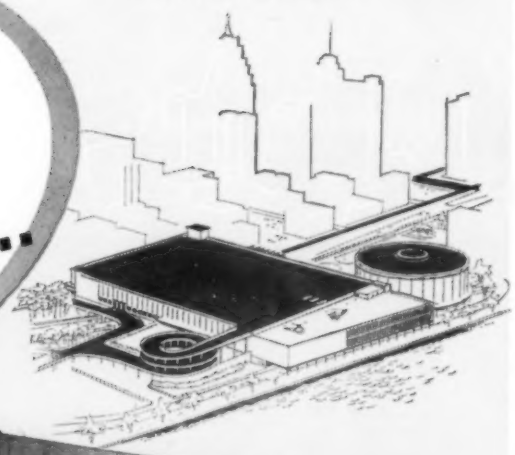
The magazine that helps plant engineers with their everyday problems

Volume 14, No. 9 Circulation of this issue 51,922

11 SQUARE D SUBSTATIONS SERVE COBO HALL...

World's largest exhibition building, COBO HALL occupies 10 acres of Detroit's Civic Center



...capable of supplying 22,000 KVA of continuous power!

Square D Field Engineer Don Selby *(right)* and Mr. Gil Brandt, Project Electrical Engineer of Giffels and Rossetti, architect for COBO HALL, examining one of the drawout circuit breakers in the low voltage secondary portion of a Square D 2000 KVA double-ended unit substation equipped with nitrogen-filled transformers

Easy, fast installation was a prime objective when eleven Square D unit substations went into COBO HALL. The various sections of each substation were completely coordinated at the factory. Reconnection of those sections at the job site required a minimum of time and labor.

Design leadership is very much in evidence in Square D's broad line of unit substations. We suggest a three-point comparison to prove the point—ease of installation, minimum maintenance, maximum safety for both equipment and personnel.

AMONG OTHER SQUARE D EQUIPMENT IN COBO HALL

31 Control Centers
28 Switchboards
450 Panelboards
75 Contactor Panels
1 Dimmer Board
10 Dimmer Panels
16 NEMA 4-Circuit Interrupters
120 Spotlight Control Panels
19,000 feet of Lay-In Duct

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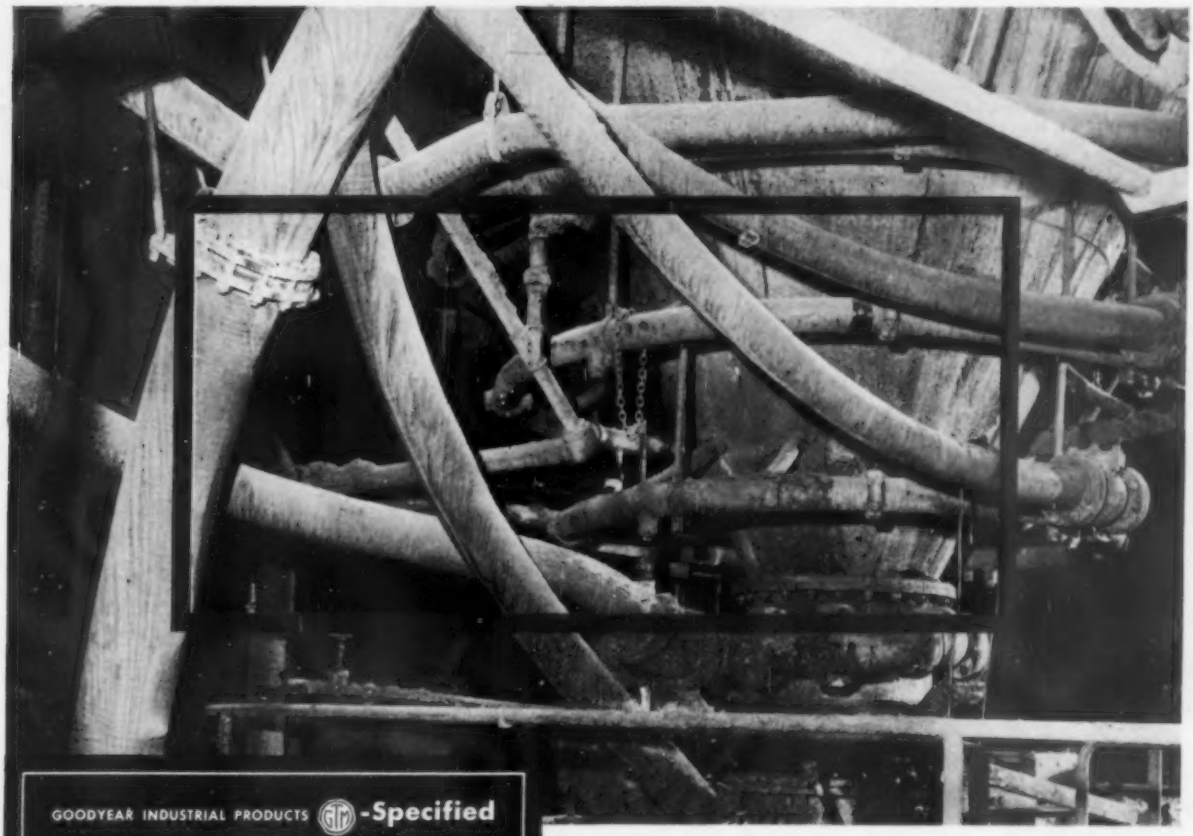
wherever electricity is distributed and controlled

For more facts circle 501 on Reply Card

GOODYEAR

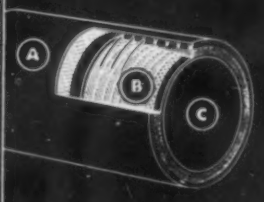
Taking 8,778,000 tons of coal to the cleaners in 5 years would have been impossible for the heaviest steel pipe. But it proved no problem to the Diversipipe recommended by the G.T.M. – Goodyear Technical Man – for the cleaning plant at this big Eastern mine. More than 650 feet of this rugged rubber pipe was installed there when the plant was new. Ever since, it's been handling both coal and silica-sand slurry–materials known to eat through high-carbon steel in a matter of months. Yet today – after averaging more than a million and a half abrasive tons a year for 5½ years–carrying it around numerous bends that invite rapid wear–Diversipipe is still going strong.

Diversipipe–T.M. The Goodyear Tire & Rubber Company, Akron, Ohio



GOODYEAR INDUSTRIAL PRODUCTS GIP-Specified

Diversipipe for handling abrasives and corrosives



A Long-lived abrasion- and weather-resistant cover

B Reinforcement of steel wire helix plus wrapped plies of heavy-duty fabric

C Special rubber tube to withstand abrasion and corrosion

Never consider any industrial materials handling problem "impossible" until the G.T.M. has taken a look and made his recommendation.

Time and time again, he and the Goodyear Distributor have supplied Conveyor Belts, V-Belts or other industrial products that do the job where others fail. Just look under "Rubber Goods" or "Rubber Products" in the Yellow Pages – or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from

GOODYEAR

THE GREATEST NAME IN RUBBER

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Engineering Appointments

Robert M. Sherwin, formerly plant engineer at the Tacoma, Washington, plant of Hooker Chemical Corporation, has been named to the newly

R. M. Sherwin

R. B. Means

created position of technical manager of the Western Chemical Division.

Robert B. Means, of the plant's engineering department is promoted to Tacoma plant engineer, replacing Mr. Sherwin.

Mr. Sherwin, born in Batavia, N. Y., received three degrees at California Institute of Technology—a B.S. degree in applied chemistry in 1943, an M.S. degree in chemical engineering in 1950, and a Ch.E. degree in 1951.

Mr. Means, born in Cordova, Alaska, attended the University of Alaska and Seattle University, later receiving a B.S. degree in chemical engineering from the University of Washington.

In 1950, he came to the Tacoma plant as a junior draftsman after working as a chemist in Alaska and as a chemical engineer in Chicago. The following year he was appointed to the chemical engineering staff. He assisted in the construction of Hooker's North Vancouver, B.C., plant and also in the startup of the new Hooker ferrophosphorus plant at Jeffersonville, Indiana.

Spray Painting School

CLASS DATES for the 1960 fall and winter sessions of the spray painting school operated by Binks Manufacturing Co., and to be held in Chicago, Ill., are: September 12 to 16, October 3 to 7, November 7 to 11, and December 5 to 9.

Lessons will cover all aspects of spray painting, including the latest developments in spray equipment systems and automatic spray controls. Airless and electrostatic spray painting will be given special attention, as well as recent developments in the field of multiple-component material spray application.

For more information and registration forms, write to Binks Manufacturing Company, 3114 Carroll Ave., Chicago 12, Illinois.

Plant Engineering Goes to Belgium's Fair

CURRENT COPIES of PLANT ENGINEERING were displayed on a "documentation board" at the 1960 Industrial Fair held in Liege, Belgium, earlier this year. This display was prepared by Mr. L. A. Berland, Consulting Engineer for the Fair, and

Plant Engineering magazine on display, right, at Belgium's Industrial Fair.

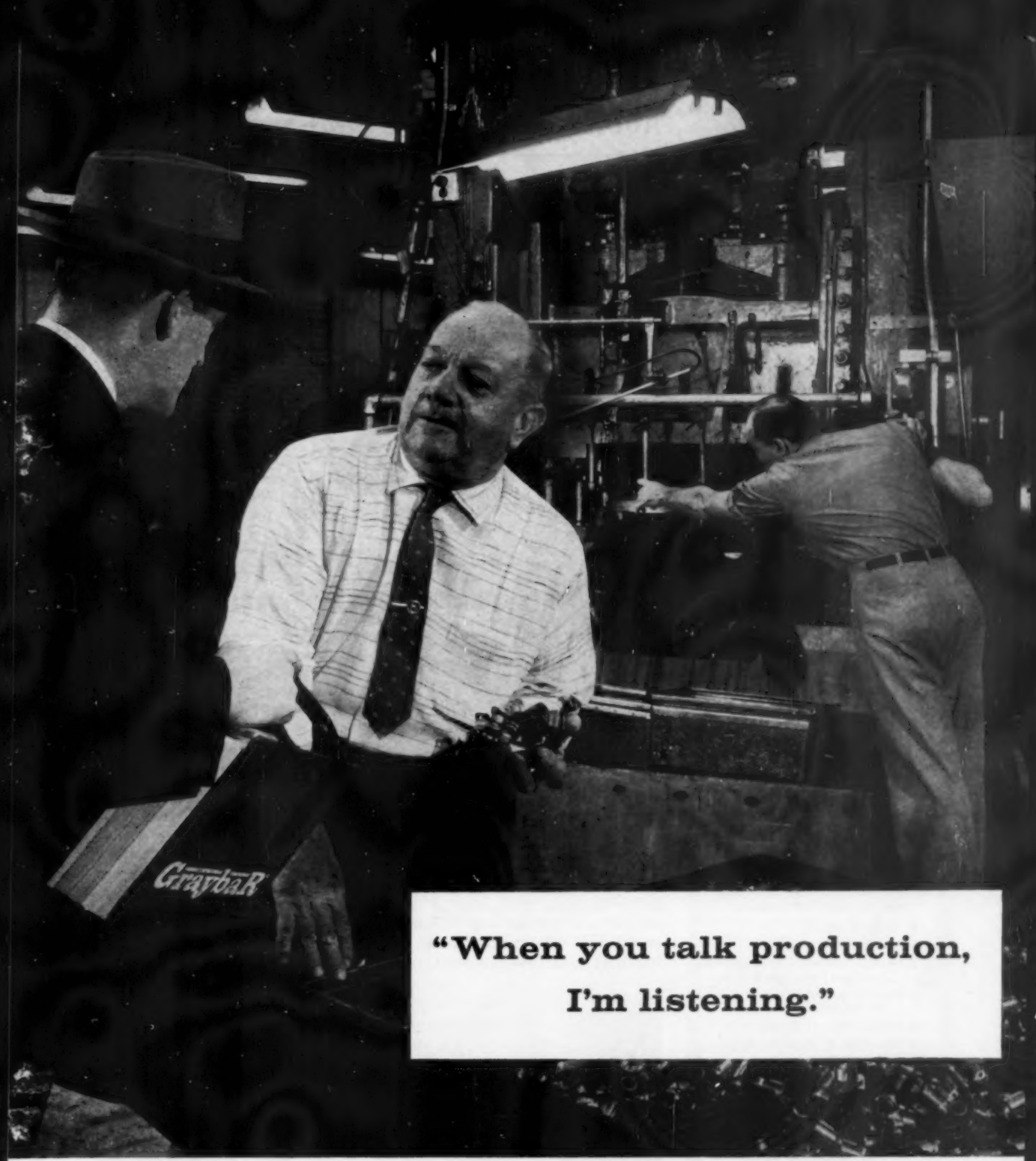
formerly associated with a plant engineers' organization in Liege, similar to the AIPE.

Plant engineers in Belgium are keenly interested in PLANT ENGINEERING articles and Mr. Berland translates many of these into French for local circulation.

Plant Engineering Workshop

PLANT ENGINEERS will be interested in the two-day session being planned at the University of Wisconsin on December 10 and 11. It will cover various phases of plant engineering

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.



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'ROUND ABOUT

operation. Most of the speakers will be plant engineers.

Here is a brief listing of some of the subjects which will be covered: The Broad Responsibilities of Plant Engineering; Training of Maintenance Employees; Effective Planning and Scheduling of Maintenance Work.

For more information about this program, send your inquiry to Engineering Institutes, University Extension Division, 3030 Stadium, The University of Wisconsin, Madison, Wis.

Open Letter to Vern Kempf, Our Electrical Editor

Dear Vern:

"My sincere thanks for the support you have given the Chicago Section of the Illuminating Engineering Society during this year as Chairman of the Public Relations and Information Committee.

"Your ideas and thoughts indeed have been prolific—also expensive. However, our publication, a true P R and I piece rather than a meeting notice, has certainly something that the Section felt worthwhile. We could point to results in almost all areas of our operation that have hinged in one way or another upon your work.

"You have been a tower of strength for the organization and one of those who is always checking on us rather than have us check on you. I know that you will continue to support Ernie and Mike to the best of your abilities.

"Again, many thanks for your support." *B. F. Avery, Chairman, Chicago Section, Illuminating Engineering Society.*

New Calculator Solves Industrial Cost-of-Light Problems

DOES THE formula

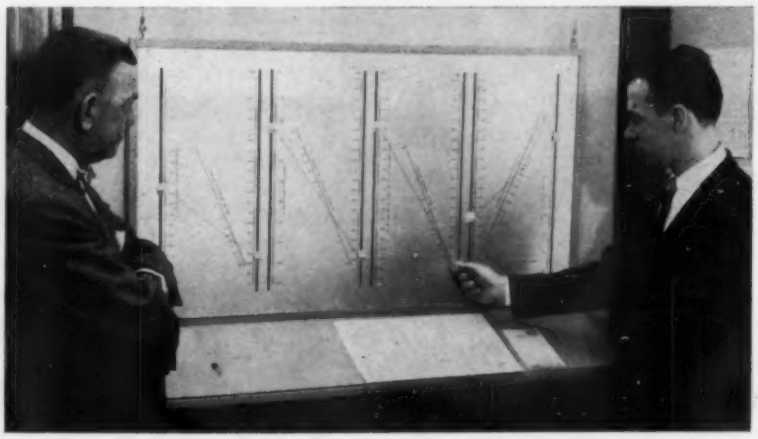
$$U = \left[\frac{F + M}{H} + R\,\overline{W} + \frac{P + h}{L}\right]\frac{10}{Q}$$

make you wish you were back in the grocery business? If so, here is a handy little device that will help you solve those cost-of-light problems.

Developed by Quent D. Dobras, Product Planning and Application, General Electric Lamp Division, Nela Park, Cleveland, the calculator consists of a series of nomographs designed to solve portions of the equation in sequence. The results of each solution are automatically translated to the final nomograph. This is accomplished by wires running over small pulleys mounted on the back of the board.

Factors set into the calculation are: annual owning costs plus cleaning in cents; thousands of hours of use per year; mean luminaire wattage in watts; equivalent cost per kilowatt hour in cents; net lamp cost plus labor cost for lamp replacement in cents; lamp life in thousands of hours and lumens maintained on the work surface. The answer is the cost of light in dollars per million lumen hours. This can be converted to cents per footcandle per hour for 10,000 sq ft.

Cost of the unit is approximately $250. A smaller portable version would probably cost $150. Anyone interested should contact Mr. Dobras.



Jim Tugman, GE Press Relations, watches Dobras set up problem on cost-of-light calculator. It has helped solve many knotty industrial lighting problems.

Kingsley L. Rice
1898 - 1960

WITH A DEEP sense of loss of an inspiring leader and a staunch friend, the entire staff of the Technical Publishing Company mourns the death of their company's president, Kingsley L. Rice, at his home in Winnetka, Illinois on the morning of August 16. He was just ending his 62nd year, and had been ill only a short time. His passing was a shock to us all.

Mr. Rice was born in Barre, Massachusetts, the son of Arthur L. Rice, one of the founders of Technical Publishing Company. He attended Wilmette, Illinois public schools, then spent two years at the Northwestern University School of Engineering, followed by two years of military service. He was graduated from Northwestern in 1920 with a degree of B.S. in Economics.

In his military service, he was with Base Hospital No. 12, U. S. Army Medical Corps, attached to the British Expeditionary Forces in northern France from May 1917 to April 1919.

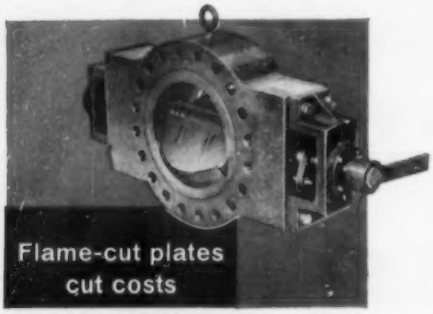
In 1920 he became a fire-insurance engineer with Missouri Inspection Bureau, and in 1922 joined the circulation division of Technical Publishing Company. He served successively as assistant circulation manager, assistant treasurer and vice president, and in 1938 was elected president of the company.

In his successive functions in the company, Mr. Rice exhibited executive ability and knowledge of the publishing business in the highest degree. He always looked forward, met obstacles with humor and patience, and fostered policies that have made the company the publisher of four outstanding national magazines.

His interest in, and first-hand knowledge of, every phase of the publishing business has resulted in his numerous services to the whole industry. For example, during World War II he was selected to set up and serve on the editorial advisory board of the Office of Censorship in Washington, on problems involving engineering journals. He was past president of the Associated Business Papers, and was currently a member of the board of directors of National Business Publications, past president of Chicago Business Papers Association and a member of Association of Industrial Advertisers. In all these organizations, his wise counsel and knowledge of technical publishing won him nationwide recognition.

He was active in the civic and recreational activities of his home town and of Chicago's North Shore. One of his favorite hobbies was curling, and he was "skip" (captain) of the Indian Hill Curling Club. He was a member of Indian Hill Club, National Press Club, University Club of Chicago and Delta Upsilon social fraternity.

METALOGICS* IN



Flame-cut plates cut costs

HIGH REJECTS: Use of flat steel castings for valve bodies, with I. D. ranging from 4" to 60", accounted for increases in costs for this manufacturer. Pattern costs rose because of numerous changes . . . rejects were high due to porosity and other casting faults that showed up only after machining.

HIGH QUALITY: Ryerson recommended using flame-cut plates ranging in thickness from 1" to 8". Results: greater production flexibility, faster delivery, lower cost and a stronger product for this high-pressure service. Tight Ryerson quality control delivered plates of exceptionally clean surface to exact thickness of finished product, requiring little machining.

Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27⅛" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛"-diameter rings with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

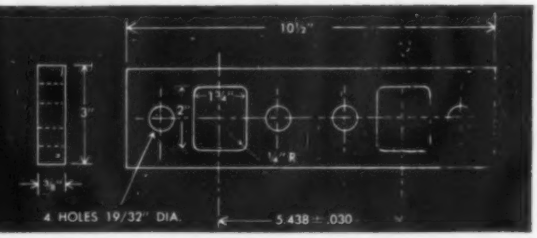
Look at these random examples and see how Ryerson Metalogics sparks real savings by continually searching for and suggesting new materials, methods and techniques.

The broadest experience anywhere combines with the widest range of stocks available to offer you unbiased recommendations on the best material for any job—be it steel, aluminum or plastics. Always the right metal-fabricating machine, too—for Ryerson is the nation's largest distributor.

Your Ryerson representative is "Metalogics-trained" to help you *value-analyze* selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

**The Ryerson science of giving optimum value for every purchasing dollar.*

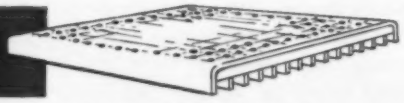
Saved: $100 per thousand



PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¾" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100.00 per thousand pieces and quickly justified the small initial investment in dies.

Suggestion saves 85%



ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅜" holes to filter the product.

RECOMMENDED: After studying application and cost, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson experience and imagination saved 85% of the original cost.

Soft touch on fabricating sheets

THE NEED: Cold rolled sheets that would take severe forming and retain smooth, dull surface for high lacquer finish. Sheet quality was found on inspection to vary widely from one shipment to the next, causing variations in forming and finishing operations . . . high reject rate.

THE ANSWER: The Ryerson representative showed how our stringent quality controls would assure consistent quality on every shipment so that forming and finishing could be standardized for better results . . . lower production cost figures.

ACTION

BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

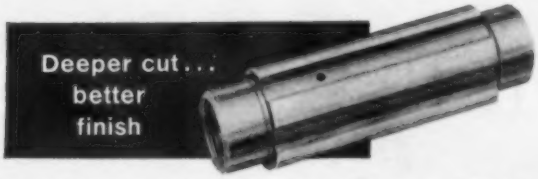
AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 s.f.m. and stepped up production 30%. Ryerson's stocks include the widest range of fast machining alloys—types and sizes to fit your every need.

OLD WAY: A screw machine shop used nylon in the manufacture of nipple adapter and coupling nuts—until a Ryerson representative came on the scene.

NEW WAY: At his suggestion, they changed to Ryertex-Omicron PVC—cut costs 50%. PVC machined better—to closer tolerances, with improved finish . . . ran faster without "gumming." Note exact cutting of threads and barbs. Threads fit perfectly.

5-DAY LIFE: The sheaves that guide the enormous digging buckets of underwater dredges take a very severe load. Bronze bearing in the sheaves had to be replaced every four or five days.

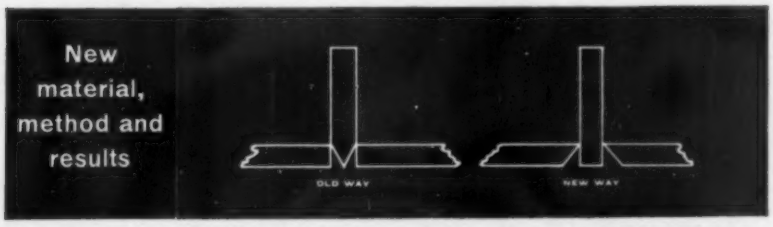
5 MONTHS, SO FAR: After discussing the problem with a Ryerson man, the chief engineer decided to try a bearing made of Ryertex. The change was made, and five months later hardly any wear was noticeable! With its low friction coefficient, Ryertex is nonbinding, even on itself.



SEARCH: Complicated machining of a carbide grade gear shaft included cuts up to ½". It was discovered that required machining was too slow with the steel chosen for the job.
ANSWER: Rycut® 40 was recommended by the Ryerson representative. This free machining alloy fit the situation perfectly. The company found that Rycut 40 machined at 250 s.f.m., gave a better finish, increased tool life, and lowered total per-piece cost. An alloy in the Rycut series may well lower your costs.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an underdriven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.



OLD: Rows of vertical aluminum grid members were attached to an aluminum base plate by notching the grid members and welding. (2024-T3 aluminum plate was used.) However, upon cooling, welds fractured—causing a high reject rate on this assembly.
NEW: A Ryerson representative suggested undercutting the base plate (as shown) instead of the grid members. This exposed a greater area to heat and permitted a larger deposit of weld material. Another Ryerson suggestion: change material to 5052-H34 aluminum, which responds better to welding operations.

PRODUCTS IN STOCK

STEEL—carbon, alloy, and stainless steel—bars, structurals, plates, sheets and strip, tubing, etc.
ALUMINUM—sheet (including new building sheet), plate, coils, rod and bar, tubing and pipe, building products, etc.
INDUSTRIAL PLASTICS—Ryertex-Omicron PVC in all forms. Also Ryertex® laminated phenolic plastics for bearings.
METALWORKING MACHINERY—the broadest line available from a single source for every kind of metal fabrication. Also specialized line of material handling equipment.

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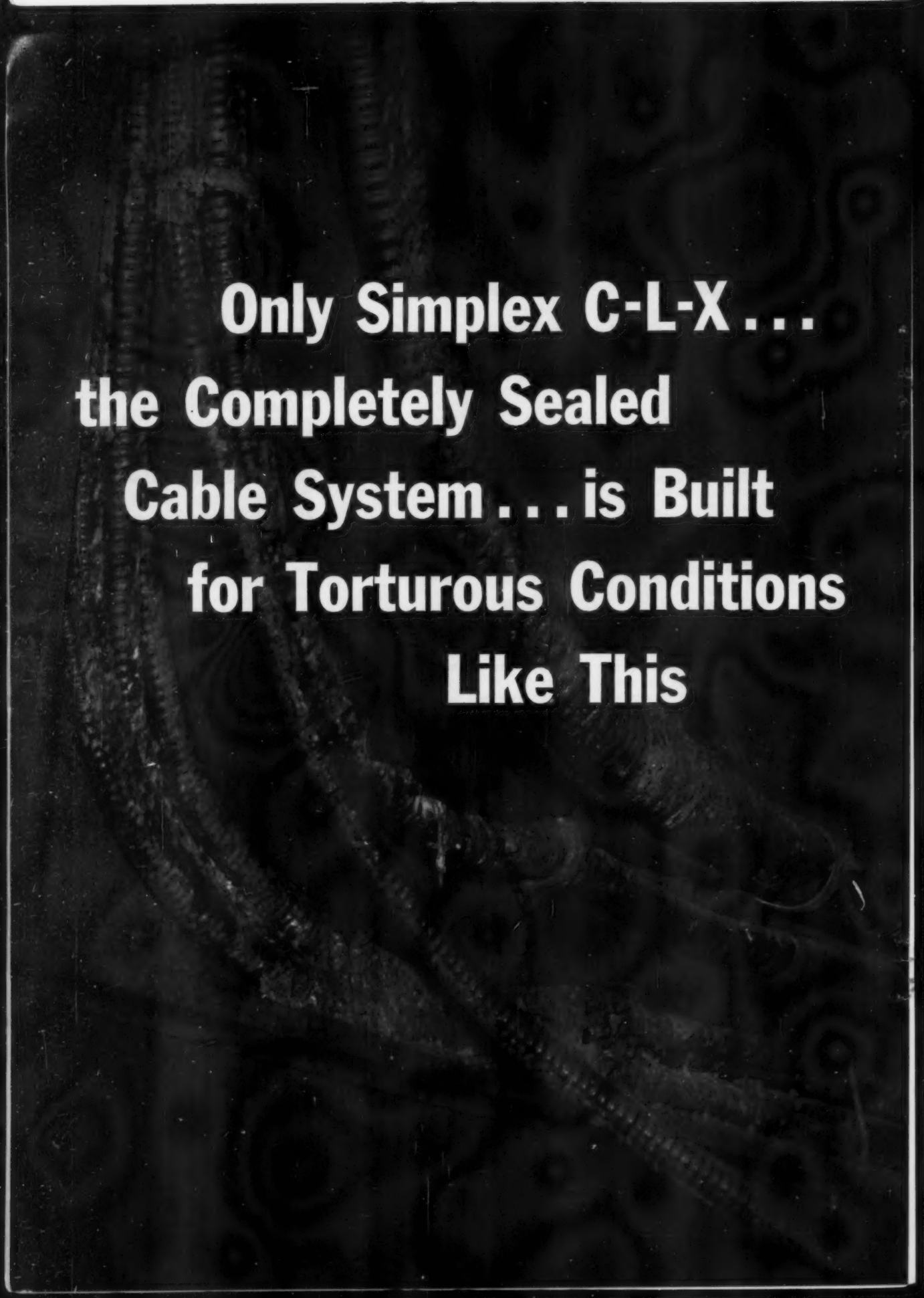
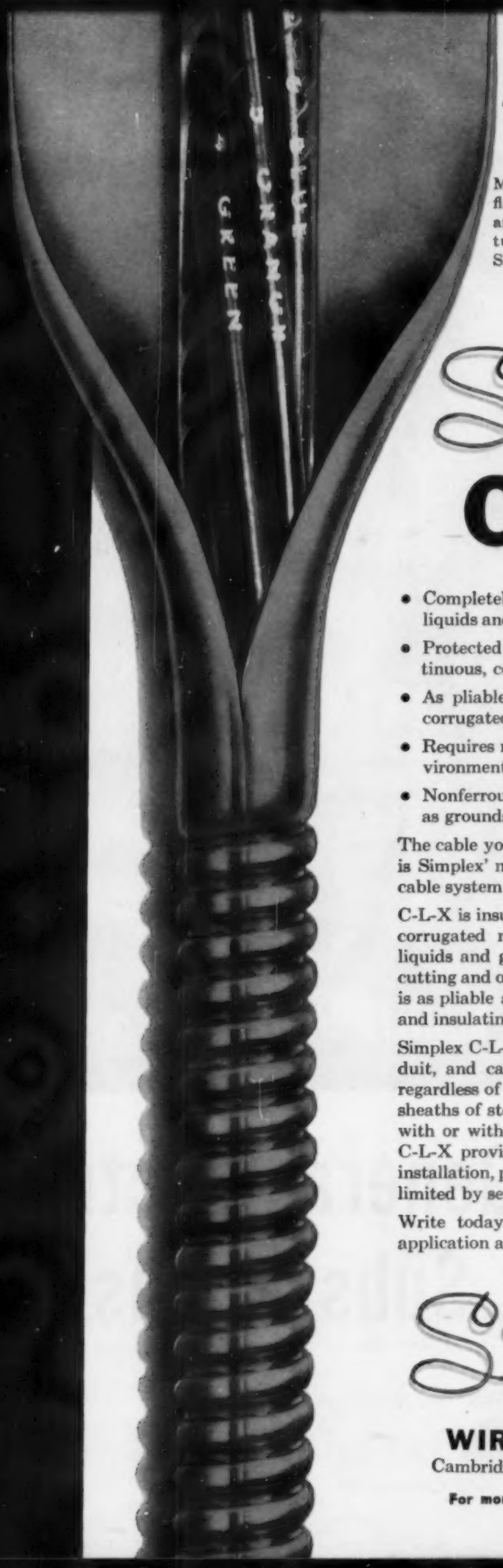

Only Simplex C-L-X . . .
the Completely Sealed
Cable System . . . is Built
for Torturous Conditions
Like This



Simplex C-L-X combines cable and duct in one integrated system

Metal, in the form of a continuous flat strip, is formed into a welded tube around the insulated cable. The metal tube is then corrugated to form Simplex C-L-X.

Simplex C-L-X

- Completely sealed to prevent penetration of liquids and gases.
- Protected against mechanical damage by a continuous, corrugated metallic sheath.
- As pliable as unsheathed cable because of its corrugated design.
- Requires no separate duct or conduit in any environment.
- Nonferrous sheaths can be designed to function as grounds or shielding.

The cable you see here is *not* interlocked armor. It is Simplex' new C-L-X . . . the completely sealed cable system.

C-L-X is insulated cable enclosed in a continuous corrugated metallic sheath. It is impervious to liquids and gases, is highly resistant to crushing, cutting and other forms of mechanical damage, and is as pliable as unsheathed cable of the same size and insulating compound.

Simplex C-L-X requires no separate duct or conduit, and can be installed in a continuous run regardless of the number of bends. Available with sheaths of steel, aluminum, copper or bronze, and with or without outer plastic jacketing, Simplex C-L-X provides the ideal solution for almost any installation, particularly those in which cable life is limited by severe ambient conditions.

Write today for illustrated brochure containing application and engineering information.

Simplex

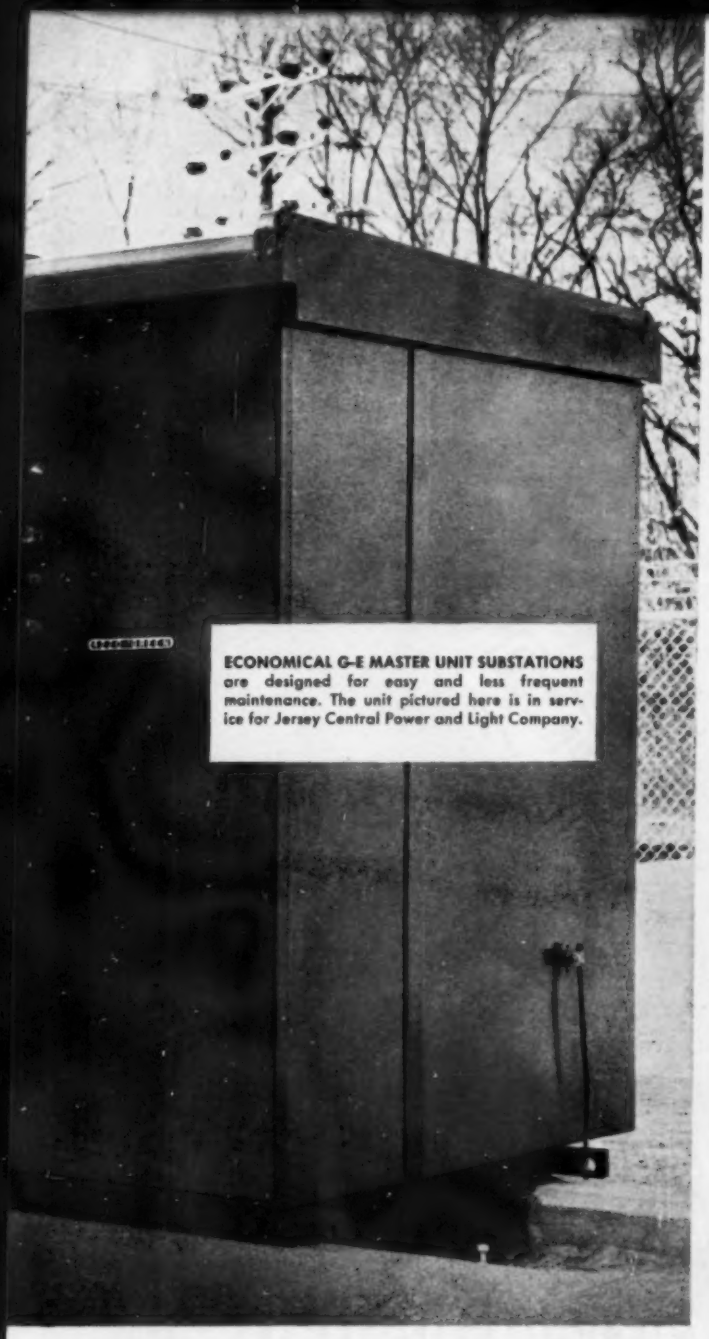
WIRE & CABLE CO.

Cambridge, Mass. • Newington, N. H.

For more facts circle 507 on Reply Card

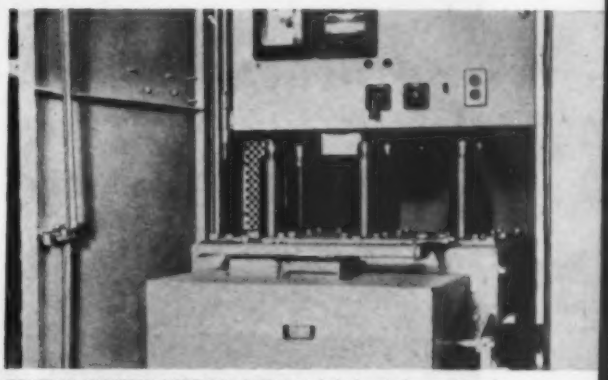
if you need **SIMPLIFIED MAINTENANCE** *you need...*

ECONOMICAL General Electric Master Unit Substations



ECONOMICAL G-E MASTER UNIT SUBSTATIONS are designed for easy and less frequent maintenance. The unit pictured here is in service for Jersey Central Power and Light Company.

TRANSFORMER MAINTENANCE is simplified by recessing indicators and making accessories easy to get at even when the equipment is energized.



GENERAL ELECTRIC VERTICAL LIFT Metal-clad switchgear is safer. You can see when the primary disconnects are parted. Maintenance can be performed by one man.

INDOOR MAINTENANCE of outdoor gear is possible with General Electric's protected aisle arrangement. This aisle is wide enough for two breakers to pass side by side within the structure.

After initial equipment cost, routine maintenance and inspection is the largest single substation operating expense. That's why General Electric transformers and metal-clad switchgear are designed and coordinated to afford top maintenance economy.

General Electric "Certified Full Value" transformers, for example, are ruggedly constructed and carefully painted to minimize maintenance. "Control center" accessory and indicator location speeds maintenance, and new load-tap-changer design cuts both noise and wear.

In addition, Vertical Lift Metal-clad switchgear maintenance—on both indoor and outdoor designs—has become a one man job. With instruments and relays now located conveniently above the breaker, routine maintenance can be performed quickly, easily.

Consider these maintenance benefits when planning for future system needs. For more information, contact your nearest General Electric Apparatus Sales Office or write for bulletin GEA-3800D, General Electric Company, Schenectady 5, New York. 512-55

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 508 on Reply Card

For fuses with 200,000 ampere interrupting capacity...

***plus,* extreme current-limitation**

plus,* time-lag to prevent needless blows – *you need...

Buss LOW-PEAK fuses

A Revolutionary New Protective Device

Buss LOW-PEAK Fuses are designed to meet modern demands for electrical protection.

They safely interrupt fault currents up to 200,000 amperes . . . limit let-thru current to exceptionally low values . . . and hold 500% load for minimum of ten seconds.

Protect Mains, Feeders, Branch Circuits, Motors, Controllers, Switches—no matter whether the fault current is 1,000 amperes, 25,000, 100,000—or as high as 200,000 amperes.

Reduce stresses and prevent damage to Panelboards, Switches, Motor Controllers—other circuit components—because let-thru fault currents are limited to exceptionally low values.

Can be easily co-ordinated into a selective system—to limit fault outages to circuit of origin.

Prevent work stoppages, lights out, waste of time and money—because long time-lag keeps them from opening needlessly on motor starting currents or other harmless overloads.

Permit increasing interrupting capacity and current limitation on present electrical system at minimum cost. Buss LOW-PEAK Fuses fit standard switches and panelboards. Available from 15 to 600 amperes in both 250 and 600 volt ranges.

Guard motors against burnout from single phasing and overloads.

Low operating temperature reduces heating in switches and panels.

Provide thermal protection for equipment against damage due to poor contact.

Protect against waste of space and money by permitting the use of proper size switches and panels.

Remain safe throughout the years without maintenance or recalibration.

▼

Write for Buss LOW-PEAK Bulletin Now . . . or use coupon.

BUSSMANN MFG. DIVISION,
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University at Jefferson, St. Louis 7, Mo.
Please send Buss LOW-PEAK Fuse Bulletin LPCS.

Name.....

Title .....

Company.....

Address.....City.....State.....

980

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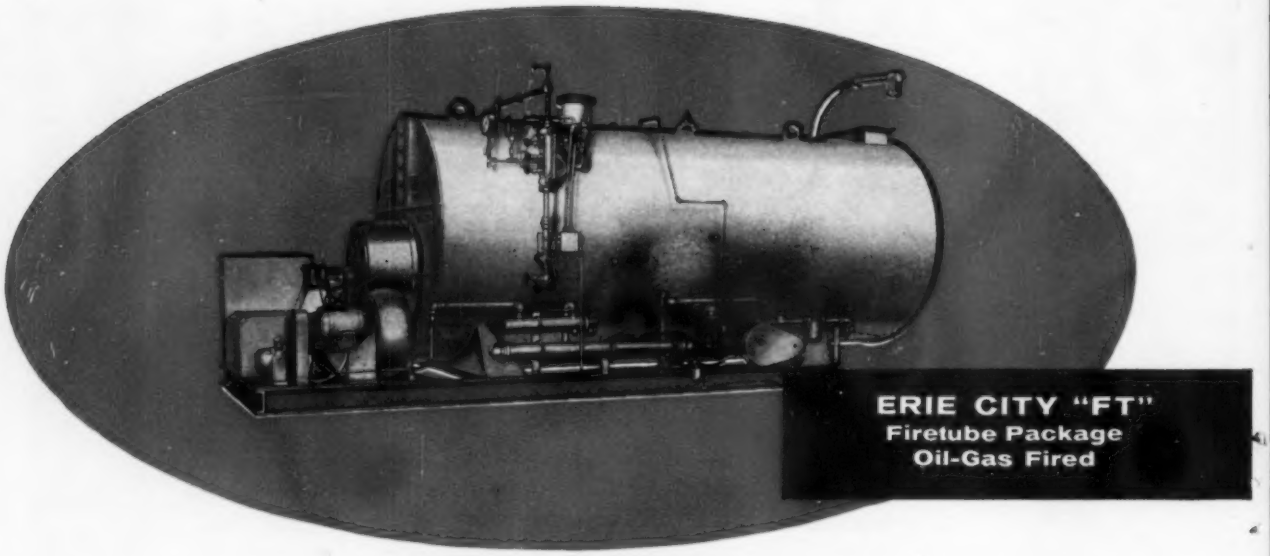
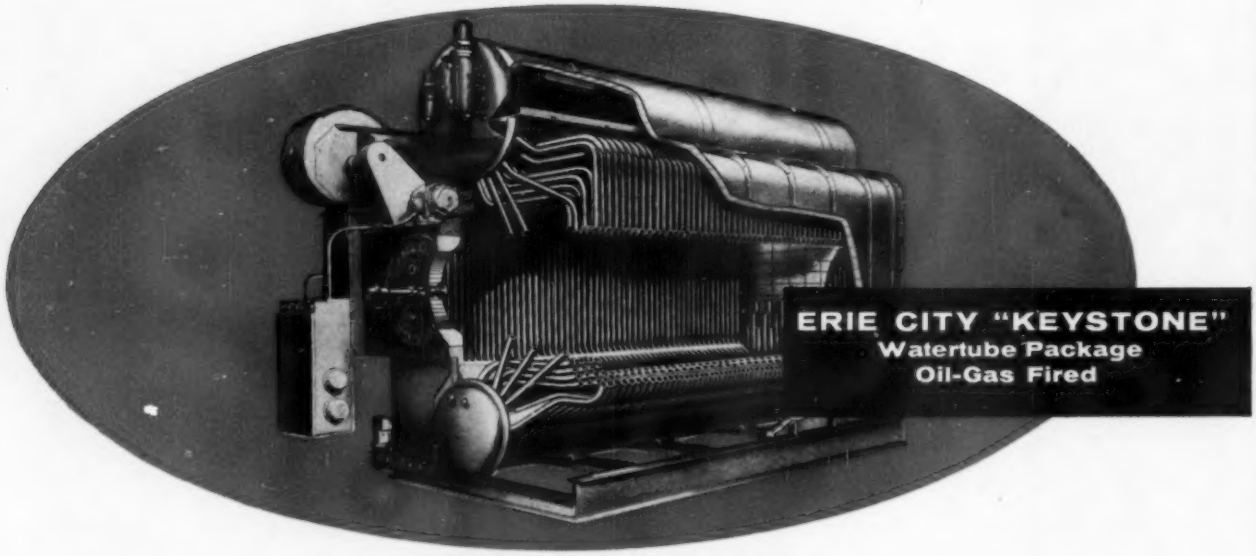
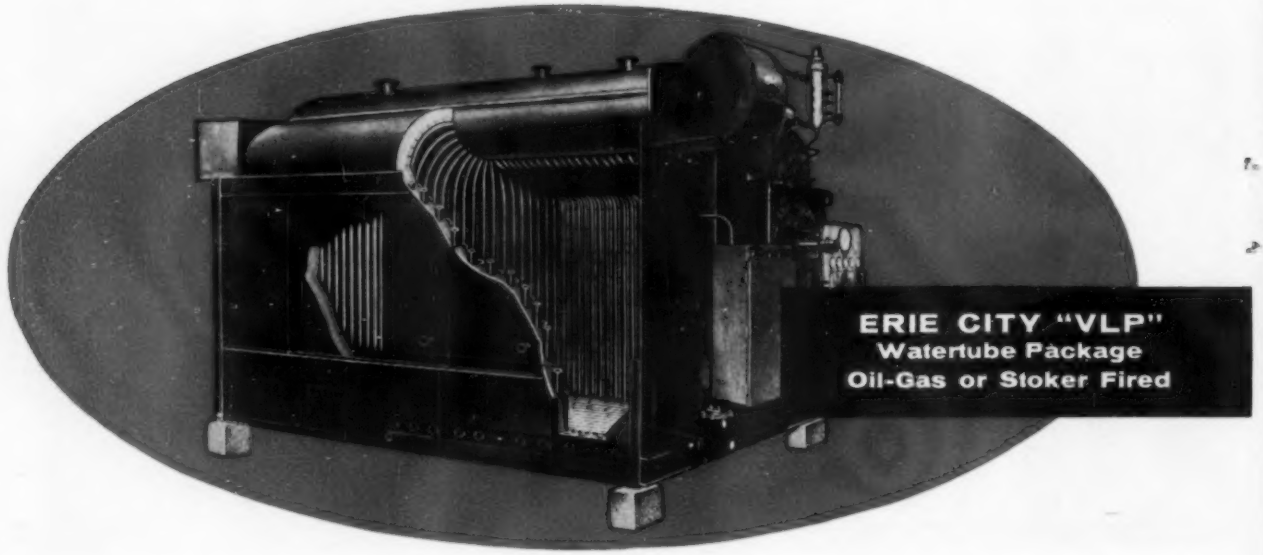


ERIE CITY "FT"
Firetube Package
Oil-Gas Fired



ERIE CITY "KEYSTONE"
Watertube Package
Oil-Gas Fired



ERIE CITY "VLP"
Watertube Package
Oil-Gas or Stoker Fired

Why shop around for Package Boilers?

Thinking about a new boiler these days? Maybe a package boiler! Sounds like a good idea because many people like this new concept of undivided responsibility. But what kind should we get? Firetube? . . . Watertube? Should it be oil fired, gas fired, arranged for future stoker firing; or which combination of these would be best for us?

The best place to find unbiased answers to your questions is Erie City Iron Works—a pioneer in the boiler industry and a leader in the package steam generator field. Erie City manufactures both firetube and watertube package units. Without prejudice their engineers can point out the advantages of both types.

After hearing the pros and cons of each, you may decide on the firetube type. Erie City offers its modern "FT" Package Boiler arranged with Erie City air atomizing oil gun and/or ring type gas burner. The "FT" Fire Tube Package unit is built to highest quality standards—not down to a price. It is a three pass design with gas vent at the rear and pressurized, using forced draft to provide precise control of excess air and CO_2. A centrifugal fan is used, which coupled to a closed combustion chamber, results in unusually quiet operation. No costly foundation—no expensive stack—no brickwork are required.

If a watertube boiler is your choice, you have two types available from Erie City. One is the KEYSTONE, the most compact water tube package available, arranged with a steam atomizing oil gun and/or ring type gas burner. The KEYSTONE is a baffleless, two drum unit completely water cooled with a seal welded inner casing and bolted outer casing for pressurized operation. No costly foundation—no expensive stack—no brickwork are required.

The other choice for a watertube package is the VLP. Your plant may be located in an area where gas, oil and coal are all available. At first you may decide to fire with oil or gas but desire the proper provision for future coal firing. The boiler for you to install is an Erie City VLP arranged for present oil and gas firing but with the furnace PROPERLY PROPORTIONED for the future installation of an underfeed or spreader stoker.

All Erie City package units come complete with burners, fans and safety and combustion controls, piped, wired and mounted on the boiler. No field work required—just make basic fuel, water, steam and electric connections and you're ready for operation.

Both the air atomizing and steam atomizing burners are of Erie City's own design and manufacture. No division of responsibility here. Qualified service engineers will assist at start up and instruct your operating personnel. In the case of the VLP, your boiler will be properly designed for future conversion to either Erie City underfeed or spreader stoker firing. Again, no division of responsibility.

Don't let the selection of a new boiler become an unnecessary problem. Write and let Erie City help make the proper selection of a package steam generator for you.

"FT" *Cat.* SB5605J

"KEYSTONE" *Cat.* SB6305-J

"VLP" *Cat.* SB5705J

• *You can depend on* ERIE CITY Since 1840 *for sound engineering*

ERIE CITY IRON WORKS *Erie, Pennsylvania*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS • WASTE HEAT BOILERS
FIRE and WATER TUBE PACKAGE BOILERS • OIL and GAS BURNERS • STOKERS • PULVERIZERS

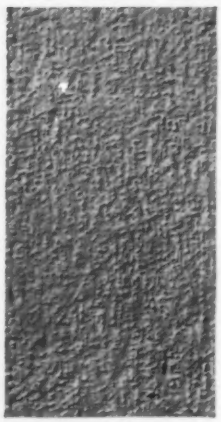
For more facts circle 510 on Reply Card

A.W. ALGRIP abrasive flooring

Bits of food just naturally fall from barrels and open cartons onto the floor of this freezer at the warehouse of a nationally-known frozen food processor, but A. W. ALGRIP eliminates slipping and sliding . . . helps prevent accidents.

A. W. ALGRIP rolled steel floor plate is produced by Alan Wood Steel Company under a patented process by which an abrasive—just like the kind used in grinding wheels—is embedded to a controlled depth. It becomes an integral part of a tough steel plate.

A. W. ALGRIP can be used as independent flooring . . . or as flooring overlay, on level or inclined surfaces. Put your plant on a safe footing, with A. W. ALGRIP . . . Approved for Safety by Underwriters' Laboratories. Write for Bulletin AL-S4.



ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • **STEEL PRODUCERS WITH THE CUSTOMER IN MIND**

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co. Ltd.

For more facts circle 511 on Reply Card

For more facts circle 512 on Reply Card →

EH G g JK **TJ** TJK eh **K** F jk LM **NF** tef
NE NM TEF KL TKL LM EH **TJ** jkl EH **k**
K EH G JK TJK **JK** TEF NF Mm TKL eh
F JK LM NF Mm **tef** EH JKL G eh JK **TJ**
K EH tjk **JK NF** LM **F** G TJK Mm KL **nm**
TJK JKL **TJ** G **jk** TKL NJ KL **JK** EH tjk

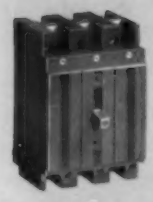
in specifying AB breakers the reign of confusion is over

For more facts circle 512 on Reply Card

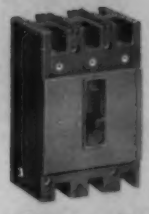
Westinghouse completely redesigns its breaker line

SIMPLE TO SPECIFY/EASY TO IDENTIFY

Newly designed breaker line simplifies frame designations . . . reduces space requirement up to 50%. Because of recent Westinghouse engineering advances, these new breakers retain the same high interrupting capacities of older designs in smaller frame sizes. The new designs mean it's easier for you to order, install and use AB breakers. Gone is the confusing assortment of letters that designate other models. These new breakers are easy to identify because they follow a common-sense sequence. They're simple to specify because you choose from only six breakers for virtually every application. They're better to use because they're smaller . . . yet you have the same quality and reliability of the former Westinghouse models you've been using.



E 15-100 amps, 240 volts a-c,
125 volts d-c, 1, 2 and 3 poles
IR @ 240 volts a-c: 7500 amps



FA 15-100 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 20,000 amps
Replaces: EH, F and G breakers
Check Westinghouse for availability of this newest breaker.

JA 70-225 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 25,000 amps
Replaces: J breakers

KA 70-225 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 30,000 amps
Interchangeable Trip
Replaces: JK and K breakers

LA 125-400 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 50,000 amps
Interchangeable Trip
Replaces: KL and JKL breakers

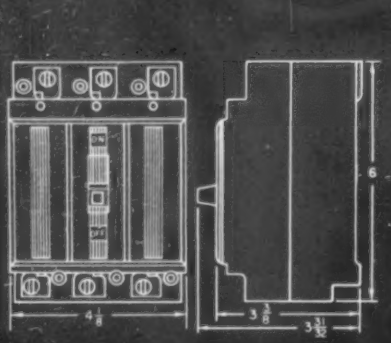
MA 125-800 amps, 600 volts a-c,
250 volts d-c, 2 and 3 poles
IR @ 240 volts a-c: 50,000 amps
Interchangeable Trip
Replaces: L, M and LM breakers

IR = Interrupting Rating

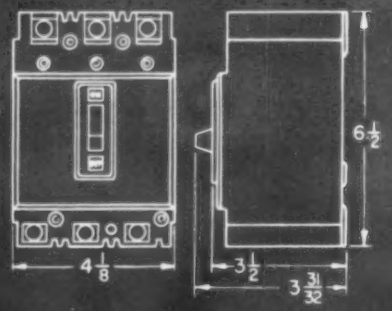
• Add the fact that terminals accept either copper or aluminum cable. Any way you look at it, the **NEW** Westinghouse line is the one you'll want to use from now on. • Want more information on this new line of breakers? Contact your Westinghouse representative, Westinghouse distributor, nearest independent panelboard-switchboard builder, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. • We're offering a free wall chart that shows the new line of breakers. It measures 17 x 22 inches, is plastic coated and gives dimensions, interrupting ratings, maximum amps and volts and, of course, the newest designations along with the breaker photos. Write to the Westinghouse address above for your copy.

All Westinghouse AB breakers meet or exceed NEMA and UL specifications.

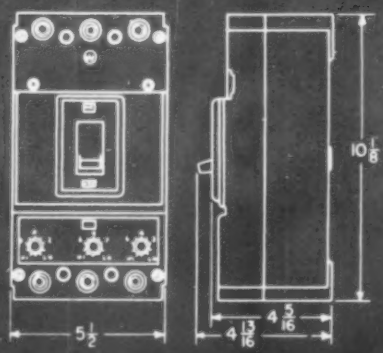
new breakers / new sizes / new designations



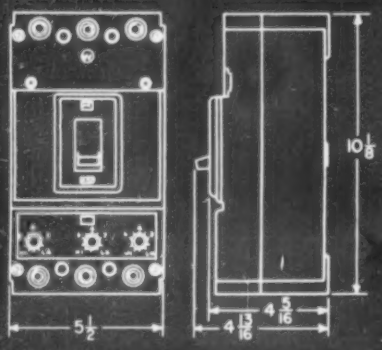
E 15-100 amps, 240 volts a-c, IR @ 240 volts a-c: 7500 amps



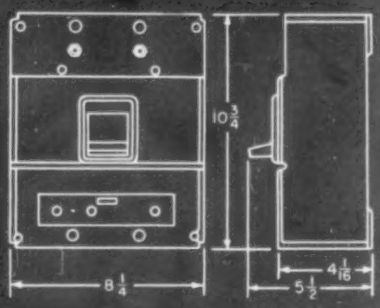
FA 15-100 amps, 600 volts a-c, IR @ 240 volts a-c: 20,000 amps



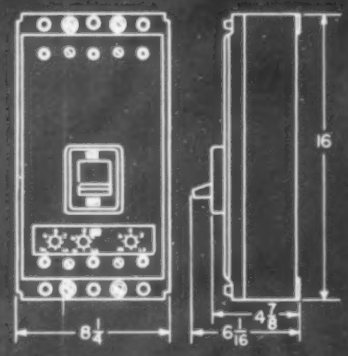
JA 70-225 amps, 600 volts a-c, IR @ 240 volts a-c: 25,000 amps



KA 70-225 amps, 600 volts a-c, IR @ 240 volts a-c: 30,000 amps



LA 125-400 amps, 600 volts a-c, IR @ 240 volts a-c: 50,000 amps



MA 125-800 amps, 600 volts a-c, IR @ 240 volts a-c: 50,000 amps

IR = Interrupting Rating

a Westinghouse breaker for every application

SAF-T-VUE* . . . lets you see whether the contacts are open or closed. Fills the needs of every industrial plant where safety codes require visible contacts. All frames.

MARK 75* . . . interrupts up to 75,000 amps at 240 volts a-c. Costs a fraction of conventional high interrupting capacity breakers. Does not require reactors or fuses, is particularly suited for network systems.

TRI-PAC* . . . smallest, lowest cost protective device you can apply where 100,000 amps can be poured into faults. Example: network systems or those fed by large transformers.

THERMAL MAGNETIC . . . provides instantaneous opening on short circuits, yet permits harmless momentary overloads such as those encountered in motor starting and initial lighting surges. On sustained overload, the higher the current, the shorter the opening time. All frames.

AMBIENT COMPENSATED . . . ends nuisance tripping, and eliminates need for derating where elevated or changing temperatures are encountered. All frames.

MAGNETIC ONLY . . . provides short circuit protection only. Primarily used on motor circuits where overload protection is provided by other means. All frame sizes except E.

WESTINGHOUSE ELECTRIC CORPORATION Standard Control Division, Beaver, Pa.

*Trade Marks

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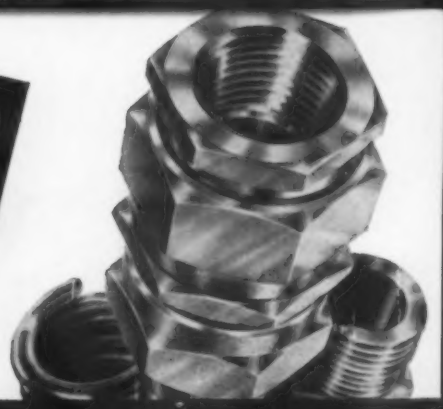
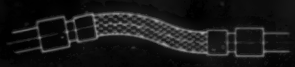
JI-30317

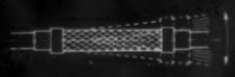
Flexonics PMS

NEW, BETTER WAY TO SOLVE ANY PIPE MOTION PROBLEM

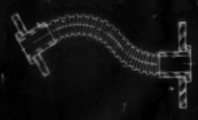




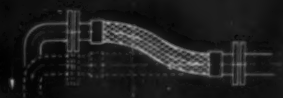
Solving shock motion and misalignment on drop forge.



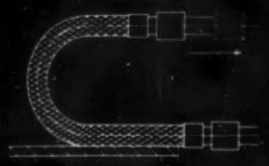
Preventing valve damage, vibration stress on compressor.



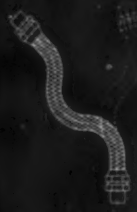
Solving piping space problem on de-waxing filter.



Correcting for thermal growth on coke oven gas connectors.

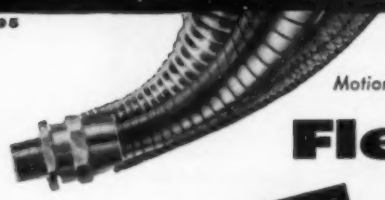


Correcting for reciprocating motion on single platen press.



Correcting for random motion on asphalt feed-line.

IH395



For expert service on all Pipe Motion Problems call your authorized

Flexonics

PMS SPECIALISTS

For more facts circle 513 on Reply Card

The one sure way to receive expert counsel on any *pipe motion problem* is to call your Flexonics PMS distributor. He is thoroughly experienced in all flexible metal hose applications. Let him analyze your need and make recommendations. He carries a broad metal hose inventory . . . has the facilities for fabricating *complete assemblies* to your specifications. This means *quick* . . . responsible service from one *local* source. Find him in your telephone directory under "Hose" or "Hose, Metal". . . or write

Flexonics
corporation

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Safety Switches for Normal and Hazardous Locations

Industrial Circuit Breakers for Normal and Hazardous Locations

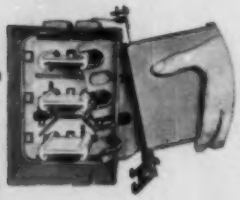
Load Centers—Circuit Breaker and Fusible

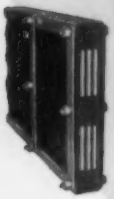
D ...design leadership D ...design l

Fusible and Circuit Breaker Lighting and Power Panelboards

Power Distribution Switchboards and Switchgear

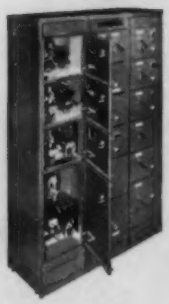
Plug-In Duct



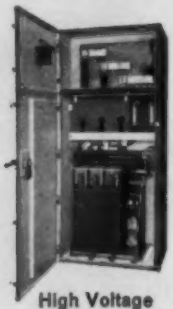


Feed-In Duct

Motor Control Centers



Synchronous Motor Starters



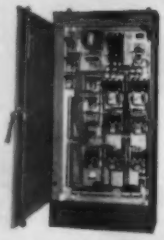
High Voltage Starters

Wireways

Field Engineering Service

is available through more than one hundred Square D offices, backed by an international network of over 1000 authorized electrical distributors and 19 plants in the United States, Canada, Mexico and Great Britain.

Executive Offices • 6060 Rivard St., Detroit 11, Mich.



Special-Purpose Control

D SQUARE D COMPANY

A *Complete* LINE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

eadership D *...design leadership*

ADJUSTABLE SPEED DRIVES
BUSWAYS & WIREWAYS
CIRCUIT BREAKERS
CONTROL CENTERS
CRANE & HOIST CONTROL
DISTRIBUTION SWITCHBOARDS
ELECTRIC TRUCK CONTROL
HIGH VOLTAGE CONTROL
LAUNDRY CONTROL
LIFTING MAGNETS
LIGHTING AND POWER PANELBOARDS
LIGHTING CONTROL—LOW VOLTAGE
LIMIT AND FOOT SWITCHES
MACHINE TOOL CONTROL
MAGNETIC BRAKES
METER MOUNTINGS
MOTOR STARTERS
PRESS CONTROL
PRESSURE, FLOAT, & VACUUM SWITCHES
PUSHBUTTONS
RELAYS AND CONTACTORS
RESISTORS
SAFETY SWITCHES
SERVICE ENTRANCE EQUIPMENT
STAGE DIMMERBOARDS
STEEL MILL CONTROL
SWITCHGEAR & UNIT SUBSTATIONS
SYNCHRONOUS MOTOR CONTROL
TERMINAL BLOCKS
TEXTILE MACHINE CONTROL
TIMERS
VOLTAGE TESTERS
WELDER CONTROL

wherever electricity is distributed and controlled

For more facts circle 514 on Reply Card

When unit heaters are "over-the-hill,"

Been wondering when this relic would quit on us. Well—let's haul 'er down . . . maybe we can patch that leak.
W-h-e-w! Wona job! For a while there I thought we'd have to blast it loose.
No wonder it leaks . . . looks like something dredged up from Davy Jones' locker. This coil is really corroded.

1 When an old unit heater starts to leak, it's almost a sure sign useful life is over. Repairs are usually a waste . . . it's wiser to replace.

2 Major repairs are time consuming . . . and costly. What's more, once a leak appears, chances are additional leaks will soon crop up.

3 Unit heater failure is generally caused by corrosion. And it's *impossible* to inspect the extent of corrosion *within* heating coil tubes.

. . . it pays to REPLACE

HORIZONTAL — Can be direct-from-pipe suspended . . . without other supports. Vertical louvres may be added for complete directional control. Available in 24 sizes.

POWER-THROW® — For hard-to-heat locations. High-velocity discharge assures exceptionally long heat-throw . . . up to 140 feet. Ten sizes.

VERTICAL — Made in 28 sizes . . . choice of 4 air deflectors. Depending upon size selected, mounting height may vary from 10 to 60 feet.

PROPELLER-TYPE GAS-FIRED MODINES feature direct-fired contoured tubes, clog-proof burners, corrosion-resistant metals. Eight sizes . . . 25,000 to 310,000 Btu.

In Canada: Sarco Canada, Ltd., Toronto 8, Ontario

repairs are a waste of time and money . . .

Well, I've done all I can for you. Here's hoping it was worth it.
Wouldn't you know . . . and on the coldest day of the year! Never should have tried to save it.
This new Modine is a beauty, Joe. We should have done this in the first place.

4 Because no one can foretell where or when the next leak will occur, repairs only prolong the unit's life for an *unpredictable* length of time.

5 Unit heater failures often interrupt production. Well-planned replacement avoids this . . . units can be replaced in summer and early fall.

6 Replacement with new Modines ends danger of shutdowns, expense of frequent repairs. And you'll find new Modines heat better, use less fuel.

with new Modines

One little leak can mean the start of skyrocketing maintenance costs. In *time* alone, it costs from $25 to $300 to disconnect, take down and re-install an "old-age" unit heater . . . depending on size, type and mounting height. Add the actual repairs — and the final cost is prohibitive. In addition, a leak is a sign that the unit is weak in other places. New leaks will probably develop soon . . . and with increasing frequency.

A planned replacement program can avoid costly production delays. Service records show that most unit heater failures occur during coldest weather . . . interrupt production at critical times. With a well-planned replacement program, failures can be anticipated. Units can be replaced in fair-weather months without hampering production.

In some plants, units are *automatically scheduled for replacement* after they have been in service for a pre-determined number of years . . . usually after they have been depreciated on the company's books.

A Modine replacement program offers many cost advantages. In teaming with Modine to establish your own replacement program, you avoid production stoppages and frequent (often useless) repairs. Also, you get the many benefits of new Modine efficiency.

Modine motors are designed for lower power consumption. Sealed-in bearings eliminate need for periodic lubrication. Vertical fins discourage accumulation of dirt, lint and other materials. Other features include improved structural strength and durability, quieter operation, lighter weight. They add up to low-cost maintenance, better heating performance, greater fuel economy.

COMPLETE REPLACEMENT PROGRAM DATA! See your Modine distributor or use the coupon to get (1) full information on replacement program, (2) 22" x 24" wall chart containing unit heater maintenance tips and a valuable performance check list, (3) Modine's "Repair or Replace?" bulletin, (4) Gas Unit Heater Installation Guide.

IMMEDIATE DELIVERY FROM LOCAL STOCK! Modine wholesalers are located in all principal cities. Call the Modine representative nearest you . . . he's listed in the yellow pages.

Modine®
MANUFACTURING COMPANY

MODINE MANUFACTURING COMPANY
1563 DeKoven Ave., Racine, Wisconsin

Send full data on replacement program ☐; wall chart and "Repair or Replace?" bulletin ☐; Gas Unit Heater Installation Guide ☐.

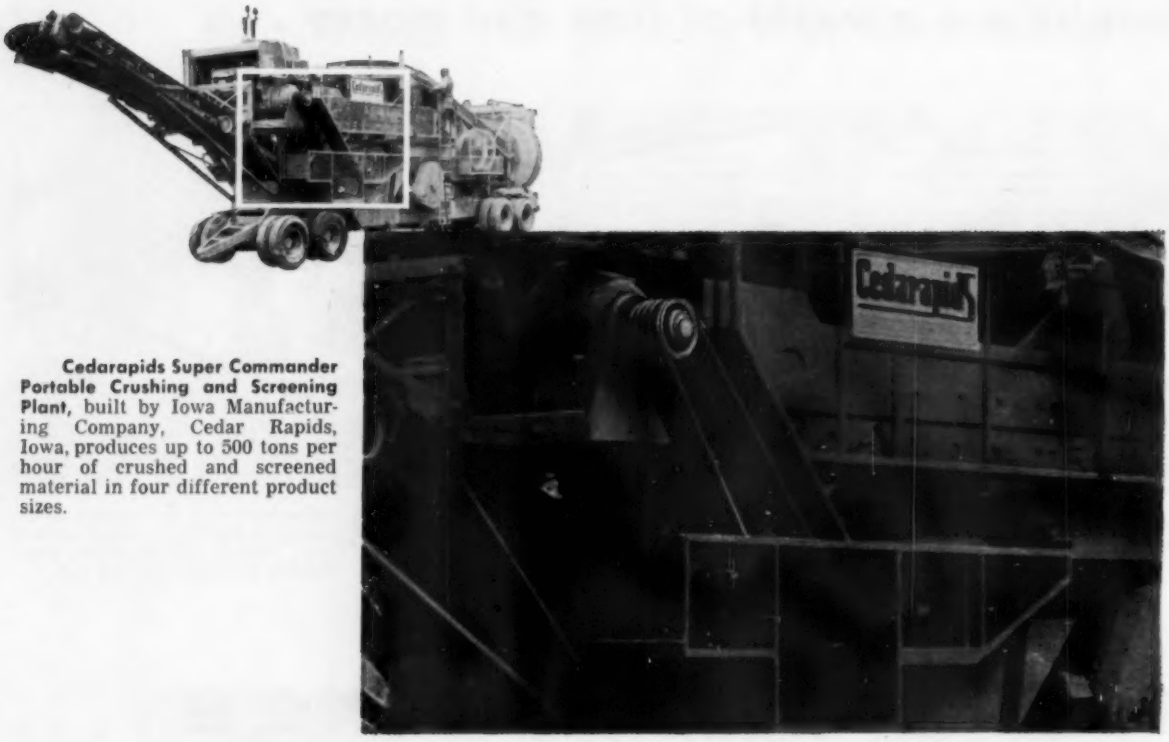
NAME .....

FIRM .....

ADDRESS .....

SU-1399

For more facts circle 515 on Reply Card



Cedarapids Super Commander Portable Crushing and Screening Plant, built by Iowa Manufacturing Company, Cedar Rapids, Iowa, produces up to 500 tons per hour of crushed and screened material in four different product sizes.

This high capacity V-Belt Drive handles

60% more power in 30% less space!

Higher Capacity of Gates Super HC V-Belt Drives solves complex product-development problem!

In developing a larger crusher, requiring more horsepower, Iowa Manufacturing Company was faced with the problem of transmitting 400 hp from a higher-speed engine in a space that had been just enough for conventional V-belts carrying 250 hp.

At the higher speeds, centrifugal force made it impossible to go to larger sheave diameters to accommodate larger belt sections. A wider span of belts was ruled out by Highway Department requirements, which restricted overall machine width to eight feet.

Iowa Manufacturing's designers solved their primary problem of transmitting 60% more horsepower with new Gates Super HC V-Belts.

Because Super HC V-Belts have smaller cross section, use narrower and lighter-weight sheaves, pack higher hp capacity in a smaller 'package' than conventional V-belts, designers also succeeded in reducing drive weight, width and height — a decided bonus in equipment that must be moved frequently both on and off the highway.

Nation-Wide Engineering Service

There's a Gates Distributor nearby to show you how to reduce drive weight, space and cost with Super HC V-Belt Drives. With Super HC, sheave diameters can be reduced 30% to 50%, drive space up to 50%, and drive weight 20% or even more.

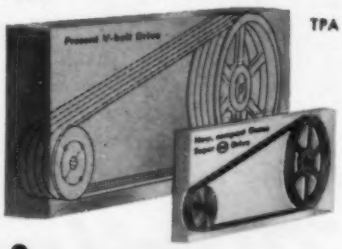
Ask your Gates Representative for your free copy of "The Modern Way to Design Multiple V-Belt Drives," or write to The Gates Rubber Company Sales Division, Inc., Denver, Colorado.

The Gates Rubber Company, Denver, Colorado

Gates Rubber of Canada Ltd., Brantford, Ontario

Gates *World's Largest Maker of V-Belts*

TPA 503A



Gates Super HC V-Belt Drives

same hp capacity in smaller "package"

For more facts circle 516 on Reply Card

BULLETINS just released and of immediate plant interest

VALVES, TRAPS, PIPING

Air Control Valves—This 40-pp illustrated specification catalog covers In-line two-, three- and four-way valves and sub-base mounted four-way and four-way five-port valves. Features valve selection tables and parts tables, cutaway drawings showing design and construction. Includes information on installation and maintenance, and on conversion to external pilot. Hoffman-Odom Co.

▲ For a copy, circle 101 on Post Card

Bronze Valves—Eight-pp Catalog 60 describes bronze valves, including screw end or sweat end gate valves with O-ring or conventional packing, renewable disc or standard brass seat screw end globe valves, screw end or copper-to-copper compression stops and valves, and a variety of gas cocks, check valves, radiator valves, circulator valves and balancing elbows. American Valve Mfg. Co.

▲ For a copy, circle 102 on Post Card

Ball Valves—Thermoplastic ball valves of unplasticized polyvinyl chloride and Penton are described in Bulletin TTP-180. Design features and corrosion-resistance characteristics are detailed. Tube Turns Plastics, Inc.

▲ For a copy, circle 103 on Post Card

Corrosion-Resistant Valves—Bulletin V-4b describes corrosion resisting valves with Teflon sleeves. Details of construction are illustrated and valve dimensions and other data tabulated. The Duriron Co., Inc.

▲ For a copy, circle 104 on Post Card

Discharge Valves—Featured in 16-pp Bulletin 02B9206 are Howell-Bunger valves designed to provide efficient regulation and control of water under free discharge. Application sketches and data are included, as well as specifications. Allis-Chalmers Mfg. Co.

▲ For a copy, circle 105 on Post Card

Feeders, Rotary Valves—Eight-pp Bulletin F-5A illustrates and describes roll and vane-type feeders and rotary valves for dry pulverized and granular materials. Photos and drawings illustrate details and tables list dimension and capacity figures. Fuller Co.

▲ For a copy, circle 106 on Post Card

Steam Traps—This 1960 Condensed Catalog contains 12-pp of technical details, dimensions, and capacity data on steam traps, temperature regulators, and heating specialties. Cutaway views and diagrams are included. Sarco Co., Inc.

▲ For a copy, circle 107 on Post Card

Ductile Iron Pipe—Properties and specifications of ductile iron pipe and fittings are detailed in this 20-pp bulletin. Table of comparative resistance in some corrosive media included along with other data and illustrative material. James B. Clow & Sons, Inc.

▲ For a copy, circle 108 on Post Card

Power Piping Erection—Field erection of high-temperature, high-pressure power piping is the topic of this 12-pp bulletin. Illustrated with photos and diagrams, it shows how detailed plans are developed, field-erection costs and quality controlled, and discusses welding. The M. W. Kellogg Co.

▲ For a copy, circle 109 on Post Card

Transite Underdrain Pipe—Bulletin TR-246A, describes use of Transite underdrain pipe in subsurface drainage systems. Advantages and economies are detailed, and installation and assembly illustrations included. Johns-Manville.

▲ For a copy, circle 110 on Post Card

Non-Corrosive Drainline—This 20-pp engineering and parts catalog describes Vulcathene, a permanent acid and corrosion resistant waste and drainage system of plastic plumbing equipment. Includes section on Polyfusion method of joining pipe and fittings, and gives technical and dimensional data. American Vulcathene Div., The Nalge Co.

▲ For a copy, circle 111 on Post Card

PUMPS, COMPRESSORS

Centrifugal Pump—Bulletin M-60 describes a centrifugal pump with canned stator and flow-through type rotor-impeller. Describes operation and includes specifications, schematic diagram, and capacity curves. The Corley Co., Inc.

▲ For a copy, circle 112 on Post Card

Submersible Pump—Illustrated and described in this 10-pp bulletin are applications for company's submersible pumps. Lists physical dimensions, pumping capacities, electrical data, specifications. Kenco Pump Div., The American Crucible Products Co.

▲ For a copy, circle 113 on Post Card

Pipeline Compressors—Mechanical and hydraulic design considerations for two-stage centrifugal pipeline compressors are detailed in 10-pp Bulletin 187. Charts, diagrams and important calculating formulae are given. Clark Bros. Co.

▲ For a copy, circle 114 on Post Card

MECHANICAL POWER TRANSMISSION

Worm Gear Drives—Engineering Catalog HGB contains comprehensive information on enclosed worm gear drives. Features simplified selection procedures and rating tables, enabling quick and accurate identification of drive to meet specific requirement. Foote Bros. Gear and Machine Corp.

▲ For a copy, circle 115 on Post Card

Differential Reducers—Detailed information on horizontal motorized differential speed reducers is presented in 16-pp Catalog HM-60. Contains engineering data, mounting information, service factors, horsepower, torque and overhung load ratings. Winsmith, Inc.

▲ For a copy, circle 116 on Post Card

Steel Conveyor Pulleys—Sixteen-pp Standard 301 includes a tabulation of load ratings applicable to standard welded steel conveyor pulleys, a list of pulley diameters considered standard for the industry, and a list of pulley face widths. Also included is selection data on pulleys. Multiple V-Belt Drive & Mechanical Power Transmission Ass'n.

▲ For a copy, circle 117 on Post Card

Stepless Variable Speed—Catalog ZM-400C560, 16-pp, presents stepless variable speed drives for fhp applications. Typical uses are listed and pictured. Operating features and installation suggestions are accompanied by diagrams and tips on power transmission. Details on all units, with or without motor, are provided. The Zero-Max Co.

▲ For a copy, circle 118 on Post Card

On pages 291-292 are the postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

Heavy Duty Pillow Blocks—Full information on heavy duty pillow blocks with self-aligning spherical roller bearings in split housings is provided in 20-pp Catalog 60. Design features of the line are discussed and illustrated and dimensions included. Booklet also gives practical information on bearing selection, prediction of bearing life, lubrication of bearings. The Torrington Co.

▲ For a copy, circle 119 on Post Card

Tailored Torque—Form P-78, 8-pp, illustrated in color, explains company's electric operating principle. Describes several clutch, brake, and clutch-brake applications, outlines specific operating advantages, and includes torque ratings and package dimensions for the product line. Warner Electric Brake & Clutch Co.

▲ For a copy, circle 120 on Post Card

INSULATION, PROTECTION

Thermal Insulation—Bulletin J-661 describes thermal and acoustical characteristics of an insulating material made of incombustible, moisture resistant mineral fibers with small amount of thermo-setting resin binder. Baldwin-Ehret-Hill, Inc.

▲ For a copy, circle 122 on Post Card

Aluminum Jacketing—Bulletin ICB describes aluminum jacketing for insulation protection. Applications and installation details are covered and photos of typical installation included. Insul-Coustic Corp.

▲ For a copy, circle 123 on Post Card

BULLETINS

(Begins on page 27)

CONSTRUCTION AND MAINTENANCE

Patterned Glass—A selection of 26 patterns in decorative, rolled and wired glass is illustrated and described in this 30-pp pocket-size booklet. Thickness, size and net weight data given. Libbey-Owens-Ford Glass Co.

For a copy, circle 124 on Post Card

Sliding Fire Doors—Design and construction features of sliding fire doors are detailed in Form DHSL-60. Cutaway diagram illustrating construction details is included, as well as suggested specifications. Dusing and Hunt, Inc.

For a copy, circle 125 on Post Card

Metal Flooring—Steel and aluminum flooring and stair tread are illustrated and described in 12-pp Bulletin 50-9. Both solid and open types are covered, and plate and panel sizes, tables of safe loads, and design, specification and installation data included. Joseph T. Ryerson & Son, Inc.

For a copy, circle 126 on Post Card

Steel Grating—Design features and advantages of electronically welded steel grating and treads are detailed in this 12-pp bulletin. Engineering data includes tables of safe loads, weights, conversion factors, and specifications. Kerrigan Iron Works Co.

For a copy, circle 127 on Post Card

Preventive Roof Maintenance—Case History R-25, of The Tremco Mfg. Co., details a planned preventive roof maintenance program and its economies. Illustrates actual methods used in surveying roof, recommended budgeting for major long-range protection, and cost reduction benefits on a continuing program. The Tremco Mfg. Co.

For a copy, circle 128 on Post Card

Water Repellent for Masonry—Dehydratine No. 22, a silicone water repellent for masonry surfaces is described in Catalog 6161. Includes advantages, description, performance, application, packaging, and functions of this product. A. C. Horn Co., Div., Sun Chemical Corp.

For a copy, circle 129 on Post Card

Why Brick Walls Leak—This Illustrated catalog explains causes and effects of leaking brick walls, and corrective measures to be taken. Details the use of Horn Hydratite Plus, including method of application, and specifications. A. C. Horn Co., Div., Sun Chemical Corp.

For a copy, circle 130 on Post Card

MACHINE SHOP AND METALWORKING

Welding Equipment—Described in 16-pp Catalog F-1379 are Unionarc welding machines, torches and supplies. Booklet also provides explanation of Unionarc welding, its applications and advantages. Illustrates equipment needed for welding installation. Linde Co., Div., Union Carbide Corp.

For a copy, circle 132 on Post Card

Disc Grinders—Illustrated and described in this 8-pp condensed catalog are high production precision disc grinders for production grinding of coil springs, carbide inserts, ceramic parts and precision components. Dimensions and specifications are given. Besly-Welles Corp.

For a copy, circle 133 on Post Card

Centerless Grinder—Introduced in Catalog 1328 is the No. 2 straddle-bearing centerless grinder. Straddle-bearing spindle, dual mobile wheel heads, and easy work loading alignment are discussed. Photos illustrate explanation of the machine's simplified operation and ability to produce more in less time. Also described and illustrated is the automatic plunge-feed arrangement for high production plunge grinding. Standard and accessory equipment are listed, specifications included. Norton Co.

For a copy, circle 134 on Post Card

Punches, Shears, Presses—Metal working hydraulically operated Hydramic presses for punching, shearing, forming, notching, bending, coping, squeezing, and riveting are described in 56-pp Catalog 60, along with portable and bench-mounted hand-operated punches and presses and tooling for both hand- and power-operated units. Information is given for hydraulically powered machines from 5 to 90-ton capacity. W. A. Whitney Mfg. Co.

For a copy, circle 135 on Post Card

Mechanical Press Brakes—Revised Catalog 2023-B, 50-pp, presents latest features and new models added to the Steelweld press line. Book is generously illustrated with photos and drawings showing available models, design features and typical installations. Specifications cover machines from 160 to 1250 tons, mid-stroke. Steelweld Machine Div., The Cleveland Crane & Engineering Co.

For a copy, circle 136 on Post Card

Tool Leasing Plan—Detailed in this 10-pp bulletin are advantages of company's machine tool leasing plan. Specific advantages are listed and features of the plan fully described. The American Tool Works Co.

For a copy, circle 137 on Post Card

METALS

Steel Weight Data—This 72-pp booklet contains useful weight tables of steel, including weights of round, square, hexagon, octagon, and flat steel bars in a wide range of thicknesses. In addition to weight tables of steel, it includes decimal equivalents, tables of area and circumferences of circles, and other formulas. Jos. Dyson & Sons, Inc.

For a copy, circle 138 on Post Card

Hard Carbide Metals—More than 75 "proven uses of Kennametal and Kentanium" are illustrated in 24-pp Booklet B-666. Shows how plant engineers have used these materials to take advantage of the enduring properties of their hard carbide compositions. Includes records of wear resistance, also resistance to impact, deformation, corrosion and oxidation at 2200 F. Cost-saving applications in more than 25 industries are described. Kennametal Inc.

For a copy, circle 139 on Post Card

MATERIALS HANDLING

Live Roller Conveyor—Form 1250 explains and illustrates principles of adjustable pressure conveyor operation and their application to live roller conveyors. Also shows typical applications. Tells types of materials and containers handled. The Rapids-Standard Co., Inc.

For a copy, circle 140 on Post Card

Continuous Vertical Conveyor—Bulletin 125 describes features and advantages of the Escaveyor, a continuous vertical conveyor designed to speed lifting and lowering. Schematic diagrams suggest some of the conveyor systems, for both horizontal and vertical continuous flow, that can be made from the units. Standard Conveyor Co.

For a copy, circle 141 on Post Card

Palletless Handling—An explanation of palletless handling, its features and advantages, is presented in this 8-pp bulletin. It is designed to give industrial lift truck users the pros and cons of pallet and palletless systems in order that they may select the most economical system. Automatic Transportation Co.

For a copy, circle 142 on Post Card

Postage Free Cards for ordering bulletins are on pages 291-292. Be sure to include your name, job title, and company even if you want bulletins mailed to your home address.

Tractors, Other Equipment—Illustrated and described in this product bulletin is a line of industrial tractors and related equipment. Covers tractor-shovels, power-angling dozers, power-tilting bulldozers, wheel loaders, fork lift, interchangeable attachments. J. I. Case Co.

For a copy, circle 143 on Post Card

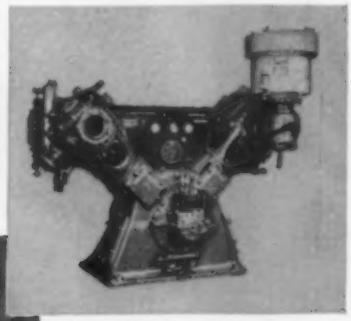
Flexible Tubing Facts—Catalog 10-19 deals with flexible tubing—nonmetallic tube and duct for handling air, liquids and light solids. Discusses briefly its varied forms, its major advantages. Flexible Tubing Corp.

For a copy, circle 144 on Post Card

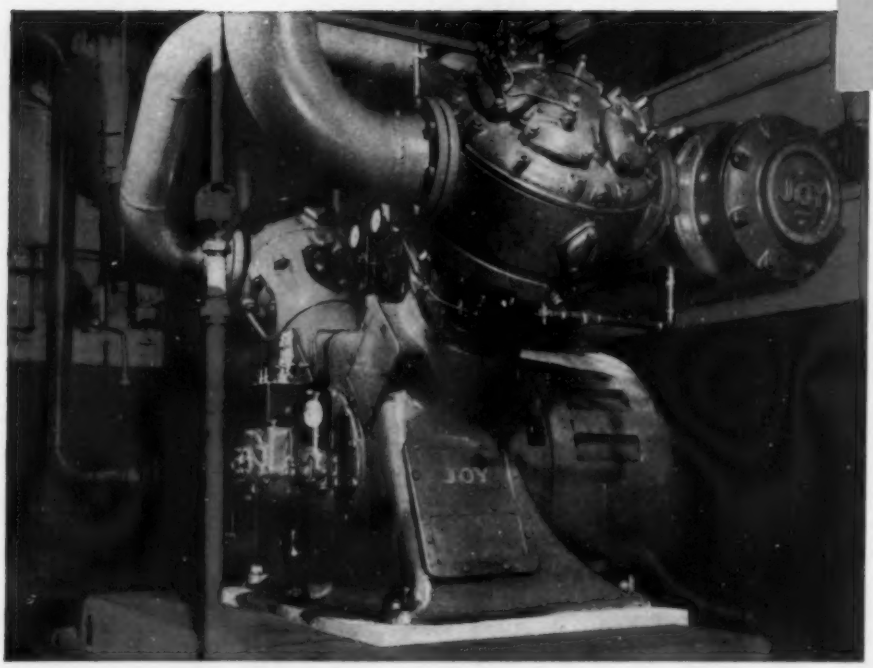
Lifting Jacks—Illustrated and described in Bulletin 205A are lifting jacks for a variety of industrial applications. Descriptive details, capacity and dimensional data included. Duff-Norton Co.

For a copy, circle 145 on Post Card

(More Bulletins on page 293)



Compact design means simple installation. Set up on a simple block foundation, bolt down and connect air and water lines.

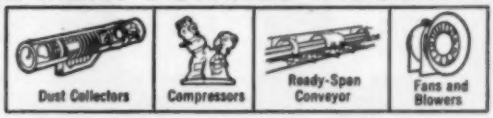


the COMPACT compressor with big compressor features... Joy WN-112

Only the package designed WN-112 has such heavy-duty features as replaceable cylinder liners and crosshead guides. These liners are made of special alloys which make possible fine machining and mirror-like polishing. The crosshead has no wedges, set screws or shims—never requires adjustment. The main bearings never need adjustment either because they are anti-friction, heavy duty ball, or spherical roller type. These, and other big compressor features add up to trouble-free performance that has made friends of literally thousands of plant and power engineers throughout industry.

When you are expanding your operations and require more compressed air, make sure you have details and complete information on the WN-112, one of a complete line of compressors for industry. You can then select any one of 24 standard models of the WN-112 plus special models for high and low pressures as well as oil-free operation. Capacities from 480 to 1072 cfm. Write for bulletin **340-15.**

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



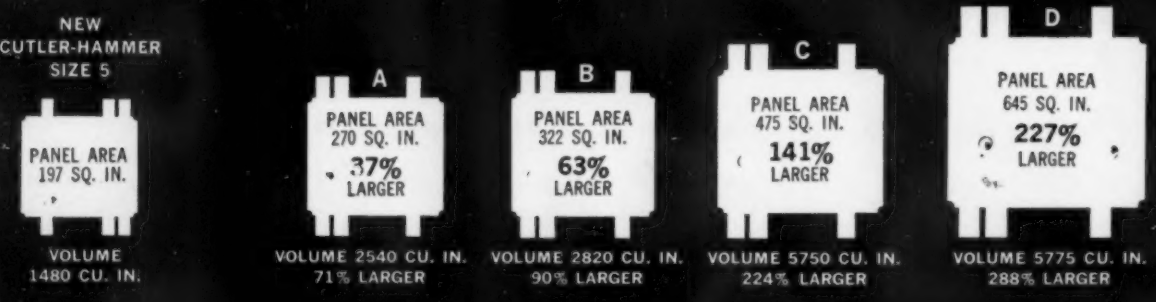
JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

For more facts circle 517 on Reply Card

THE NEW CUTLER-HAMMER SIZE 5 STARTER IS FAR MORE COMPACT THAN OTHERS



Now! A complete line of easy-to-install Cutler-Hammer Starters including a new compact Size 5

7 sizes for use as components or as complete starters
(Size OO, O, 1, 2, 3, 4 and 5)

Now get all the advantages of Cutler-Hammer's Three Star starter line in seven sizes. You can control motors from fractional hp up to 200 hp, now that the new Size 5 is available.

The new Size 5 starter needs only an eight-inch deep case. Its open dimensions are only 13" wide, 15 3/16" high, 7½" deep . . . and is available as a non-reversing or reversing starter or as a contactor.

Even the wiring's easier. Instead of struggling to force the line and load cables into the lug connectors, the lugs unbolt, and are easily reassembled.

You still get, of course, the famous Three Star advantages that have made Cutler-Hammer Starters so famous: dependable pivoted armature, vertical contacts that don't collect dust, ease of installation, ease of inspection and maintenance, plus many other features.

Be sure to send for Pub. LO-69-U274 to get all the facts on the complete Cutler-Hammer Starter line.

What's New at Cutler-Hammer? There's a new spirit here. You can see it in the new products, the new engineering talent, the increased plant capacities. We're ready for the great growth of the sixties so you can be ready to meet the great demands upon your capacities. We'd like to tell you more. Contact the Cutler-Hammer electrical distributor or the Cutler-Hammer sales office nearest you.

WHAT'S NEW? ASK...
CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

For more facts circle 518 on Reply Card

"Here at MINNESOTA MINING we're coating*

3M COMPANY has branched out from its original sandpaper business into a wide variety of product lines. However, most of these product lines are direct descendants of sandpaper, 3M's original product, in the sense that *coating techniques play an important part in these products. This is true of such seemingly unrelated items as presensitized lithographic plates, pressure sensitive tapes, decorative ribbon, roofing granules and reflective sheeting.

As specialists, we liked the OTIS specialist's approach to Elevator Maintenance right from the start. We decided it was the only way to keep our 6 OTIS Passenger Elevators and 10 OTIS Freight Elevators running at their original efficiency during their entire lifetime. We've been using OTIS Elevator Maintenance since 1933.

What is the OTIS specialist's approach to elevator maintenance? It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

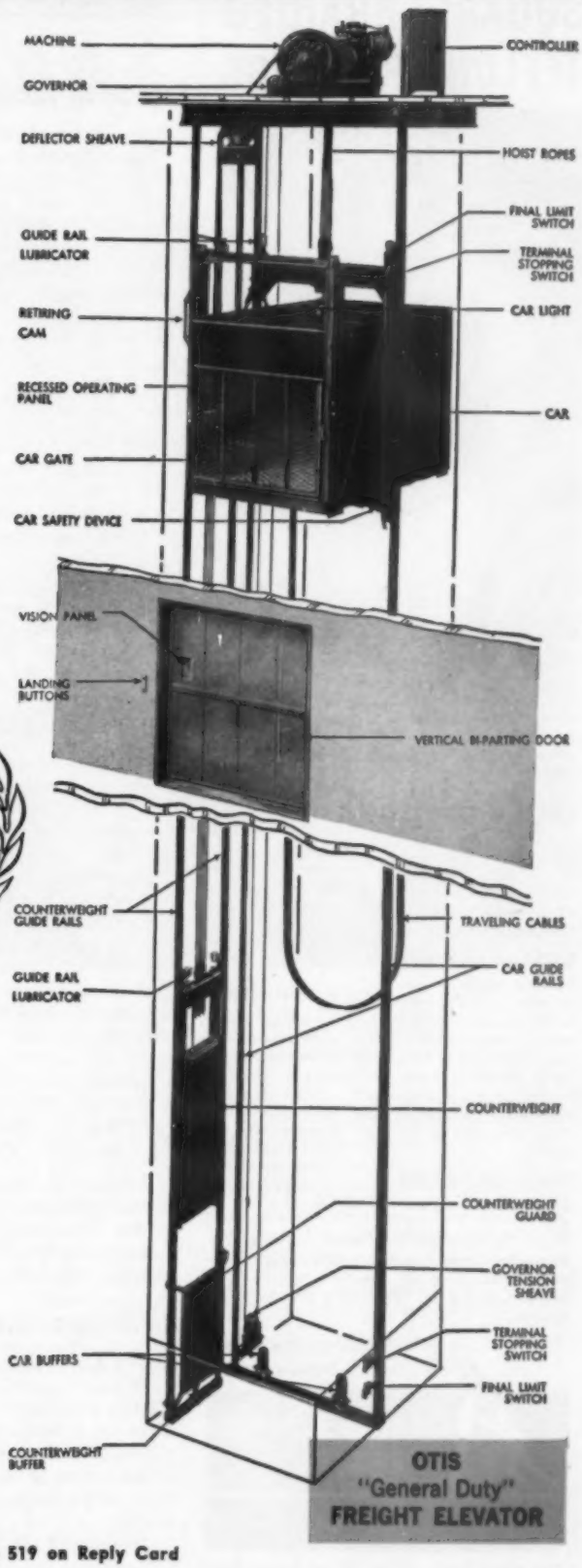
METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

freight elevator maintenance

THAT KEEPS ELEVATORS RUNNING LIKE NEW

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

men . . . not elevator maintenance men"



3M COMPANY

MINNESOTA MINING
and
MANUFACTURING
COMPANY
ST. PAUL

For more facts circle 519 on Reply Card

CHEMPRO SQUARE-BRAIDED TEFLON* PACKINGS

Chempro Square-Braided Teflon Packings are tough, strong and chemically inert. They outlast ordinary braided packing many times over, holding together longer against even the strongest acid, alkali or organic solvent. Here are four popular Chempro Square-Braided Teflon packings:

STYLE No. 400 PACKING
Constructed of pure Chempro tape, braided square without lubrication. For highly corrosive services where a lubricant is undesirable.

STYLE No. 400-F PACKING
Resilient, square-braided packing of Chempro Teflon multi-filament yarn, without lubrication. For pump and valve applications in highly corrosive services where the packing must "give" to a certain extent.

STYLE No. 400-FI PACKING
Square-braided packing of Chempro Teflon multi-filament yarn and impregnated with Teflon suspensoid. This dense packing was developed for gas and vapor services where other lubricated packings were not acceptable.

STYLE No. 400-FL PACKING
Made by square braiding Chempro Teflon multi-filament yarn and externally lubricating with a non-hardening and non-melting lubricant. Recommended for high speed applications and highly corrosive services, from freezing to 350° F.

These Chempro Braided Teflon packings are available in all sizes in standard 1/16" increments from 1/8" to 3/4" square—in spool or coil forms. Can be cut to specific ring sizes, if desired.

Write for revised Bulletin CP-552.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 520 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Requests for Tearsheets

PLANT ENGINEERING:

"Please send me tear sheets on the following articles appearing in the June, 1960 issue of your very fine publication: 'All-in-one System for Cleaning, Processing, Painting,' page 106; 'Low-Cost Computor Room Construction,' page 130; 'Tattletale Probe Squeals on Lost Vacuum,' page 140; and 'What Pressures Mean to Pump Operations,' page 114." *R. N. Mitchell, Plant Superintendent, Reynolds Metals Company, Richmond, Va.*

PLANT ENGINEERING:

"Congratulations on a very informative article in your June issue of PLANT ENGINEERING, titled 'Organizing Maintenance for Numerically-Controlled Machines,' by H. A. Smith. I would appreciate reprints of this article." *P. T. Tucker, Supervisor, Production Methods, Plant Engineering, Rocketdyne Div. of North American Aviation, Inc., Neosho, Mo.*

Performance Standards Sought

PLANT ENGINEERING:

"We are going to improve the reliability, appearance, operation and maintenance of our service areas; such as fans, rooms, compressor rooms, elevators, substations. As the first step, we are attempting to define the standards of quality and performance expected from those areas. Do you have any articles or literature on what other companies have done for defining this type of standard? These standards are not preventive maintenance nor labor standards, but equipment performance, housekeeping, safety and reliability." *Edwin A. Blough, Plant Engineer, Pressware Plant, Corning Glass Works, Corning, N. Y.*

► Sources of information that Mr. Blough is seeking have been forwarded to him, but if readers have any suggestions that would be of interest, they should write to him direct.—*Editors.*

Organizing a Salvage Department

PLANT ENGINEERING:

"We are interested in setting up a salvage department as part of our Engineering & Maintenance division. Do you have available information on the organization and operation of a salvage department in manufacturing plants?

"We would also be interested in any available cost data, showing value of reclaimed material versus the cost of operation of the salvage department." *A. H. Soeder, Sup't., Engineering & Maintenance Div., Union Carbide Metals Company, Niagara Falls, N.Y.*

► Tear sheets of a number of articles from past issues of PLANT ENGINEERING, which should answer Mr. Soeder's questions, have been forwarded to him with the compliments of the editorial department.—*Editors.*

"Construction Extras" Article

PLANT ENGINEERING:

"The article, 'Watch Out for Those Construction Extras,' on pages 120-121 of July, 1960 PLANT ENGINEERING provides an extremely important service which I hope few of your addressees will overlook.

"Just to make sure that it receives notice in my division of our company, I hope I can prevail upon your generosity by requesting 40 reprints of the article to be circulated to our key people who sometimes do not make it inside the covers of your fine publication. If you haven't this number, may I have permission to have the article reprinted for internal distribution only?" *J. R. Jackson, Staff Engineer, Container Corporation of America, Chicago, Ill.*

Evaporative Roof Cooling

PLANT ENGINEERING

"We read with interest 'Lawn Soakers Take to the Roof' by Mr. K. L. Biddle in your May, 1960 issue. However, there are some points which were not mentioned but which we believe are essential when considering such a cooling system.

"First, 'We have not made any quantitative measurements on inside temperatures, but our experience has shown that they are noticeably lower.' Such a statement provides no real justification of a system, unless Mr. Biddle is referring to its psychological effect.

"It would be interesting to know the design conditions on which this system was based. If the humidity is high, the effectiveness of such a system is drastically reduced.

"Obviously, such a system is good only in dry climates and when solar heat gain through the roof is an appreciable percentage of the total cooling load. If machinery and equip-

Huge Kansas repository for wheat and milo, the C-G-F Salina Elevator is weathertight and attractive under Storm King Aluminum Coating, a product of Warren Refining and Chemical Co., Cleveland 2, Ohio.

Perhaps nobody is more particular about plant maintenance than successful grain men. They deal with a commodity sensitive to heat, moisture, mold and insect damage. That's why management of C-G-F Salina Elevator (one of the world's largest) uses Storm King Aluminum Coating, made with ALCOA® Pigment. Everywhere, on concrete elevators and metal sheds—roofs and sides—bright, reflective Storm King Aluminum Coating lends uniform good appearance and weatherproof protection.

Let's get down to specifics. Good aluminum coatings like Storm King combine pure ALCOA Aluminum flakes in a tough asphalt-asbestos base. The aluminum "leafs" to form a brilliant, metallic top surface that protects the vital oils from the sun, keeps the coating pliant. These coatings allow for slight structural movement, prevent moisture absorption, spalling and deterioration. Reflective aluminum pigment turns back much of the sun's heat, keeps interiors cooler.

More and more maintenance-conscious industries today are specifying aluminum coatings such as Storm King. Applied with either ordinary roofing brush or heavy-duty spray equipment, these coatings come ready mixed, require no thinning or heating.

ALCOA does not make roof coatings, but we will be happy to refer you to reputable manufacturers who do. Please send coupon for informative booklets.

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and "Alcoa Theatre" alternate Mondays, NBC-TV

Aluminum Company of America
1790-J Alcoa Building, Pittsburgh 19, Pa.

Please send your free booklets:

☐ *Painting With Aluminum*
☐ *Aluminum Roof Coatings Make Time Stand Still*

Name_____

Company_____

Address_____

City_____ Zone____ State_____

ALCOA ALUMINUM

PIGMENTS, PASTES AND POWDERS

For more facts circle 521 on Reply Card

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UNITIZED
COMMUNICATION EQUIPMENT for POWER and INDUSTRY

Effective! Reliable! Economical!

1 Highly effective in extremes of ambient noise and temperature.

2 Plug-in units provide ease of installation, expansion and maintenance.

3 Transistors and rugged, industrial type components used throughout.

4 Central control cabinet, costly engineering and fabrication eliminated.

Wherever a highly dependable, voice communication system for use in high noise level areas is needed—you'll find GAI-TRONICS specified by name.

GTC is extremely flexible in application. Write today for a copy of our completely illustrated, descriptive booklet and name of nearest representative.

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ENGINEERS AND CONSULTANTS

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BACKTALK—FORETHOUGHTS

ment make up the major portion of the load, then evaporative cooling is inadequate.

"From the pictures it appears that the roof is a bonded type with a 20-year guarantee. It is our experience that roofing contractors waive all claims on the guarantee when water, from other than natural causes, is sprayed on a roof unless additional expenditures make the roof moisture free.

"This brings us to the economics of this system as opposed to an enlarged refrigeration machine. It would be interesting to see his breakdown of costs.

"We are not opposed to evaporative roof cooling, but we wish to emphasize that this system is subject to many conditions which cannot be overlooked in a design of this kind." *D. G. Bellow and R. C. Webb, Canadian Chemical Company, Ltd., Edmonton, Alberta.*

▶ Here is Author Biddle's reply (it should be noted, that owing to length, both letters have been edited):

"I must agree with you in taking exception to my statement about not having made any quantitative measurements. Since this was not a controlled experiment, I decided there were too many variables to be able to get repeatable conditions. However, we do sprinkle over conditioned and non-conditioned areas. In one air conditioned office with exposed roof —5 ply T & G and ½-in. insulation— on hot sunny days we cannot control to design temperature without operating the sprinklers. In another non-conditioned shop area which was being sprinkled, we received a complaint about the heat and a request for fans. On checking, we found that our pump had kicked out and that the sprinkler was not operating.

"In Rockford, the commonly used design conditions are 95 F dry bulb and 75 F wet bulb. I agree that high humidity reduces the effectiveness of evaporative cooling, but my understanding is that with roof temperatures ranging from 130 F to 160 F, the temperature of the air immediately above the roof is raised and the relative humidity is decreased. Thus effective evaporation occurs under even normally adverse conditions. With our crude instrumentation and methods, we measured roof temperatures of 125 F to 130 F, dropping to 95 F to 100 F.

"I do believe roof sprinkling is effective where the heat gain through an exposed roof is appreciable, and I refer to ASHRAE Guide for 1960, Chapter 13, Table 9.

"You are correct in pointing out that unless a major portion of the heat load is in the ceiling, the over-all reduction may not be great. Roof sprinkling, however, can easily cut the load on a sunlit roof by half.

"Our roof is a bonded roof with a 20 year guarantee. Our roofing contractor said his objection was to standing pools of water only and that sprinkling with run-off as during a normal rainfall was not only acceptable but preferable, as it would keep the roof temperature down.

"The sprinkler system cost about 25 per cent of the air conditioner. I have no idea if this ratio would apply in all cases as there are so many factors contributing to cost. The figure of approximately $800.00 was our cost for labor and material and the $3000.00 was the cost of a 15-ton air conditioner set in place and connected."

New Readers

PLANT ENGINEERING:

"Please send me a copy of the reprint series on Fluid Power Maintenance for which I am enclosing a check in the amount of 75 cents.

"Inasmuch as I do not always have the opportunity to have a copy of PLANT ENGINEERING pass across my desk, I would greatly appreciate it if I could receive a subscription to this interesting periodical. I particularly enjoy the maintenance articles which appear in PLANT ENGINEERING along with various articles pertaining to utility design in plant layout. Articles of interest are clipped and filed for reference." *Charles M. Nohavec, Staff Engineer, Falstaff Brewing Corporation, Saint Louis, Mo.*

PLANT ENGINEERING:

"Looking at an old issue (September 1959) of PLANT ENGINEERING, I saw your 'Backtalk and Forethoughts' column (which I assume is published monthly with the magazine). In the column, requests were made and granted for reprints of articles on the plant engineering profession.

"I too, am interested in these and would like to know how to obtain them. Could you also let me know how I can subscribe to PLANT ENGINEERING magazine?" *Richard G. Olsen, Maintenance Planning Engineer, Gulf Oil Corp., Philadelphia, Pa.*

▶ We are pleased to fill these requests for reprints with which we have forwarded application forms for the magazine.—*Editors.*

For more facts circle 523 on Reply Card

Longer Life! Superior Dependability!

THE ALLEN-BRADLEY LINE of BULLETIN 700 RELAYS IS COMPLETE!

TYPE B general purpose relay shown with 2 N.O. and 2 N.C. contacts. Made with up to 8 poles in various arrangements.

TYPE BX universal relay shown with 4 poles having both N.O. and N.C. contacts. Additional contacts on the 6 and 8 pole relays are N.O. only.

THESE IMPROVEMENTS ARE *IMPORTANT!*

These improved Bulletin 700 Type B and Type BX relays are establishing new standards for relay life and reliability. New design increases mechanical life by *at least 5 times* . . . a new contact motion insures *at least 10 times* greater electrical reliability. Double break, silver contacts never need maintenance, and the new molded coil is impervious to the most severe atmospheric conditions.

These new A-B relays—with their *extra millions of trouble free operations at no increase in price*—are a bargain in the relay field. Write for complete details, today.

NEW ENCLOSURES

for the Bulletin 700 relays are styled by Brooks Stevens—internationally famous industrial designer. Note the "family" resemblance of these enclosures.

NEMA 1

NEMA Type 1 for general purpose applications with wrap-around cover for ready accessibility. It has a "quality" appearance.

NEMA 4

NEMA Type 4 enclosure for applications that require a watertight and weatherproof seal.

NEMA 7

NEMA Type 7 enclosure for NEC Class 1, Group D hazardous gas locations.

11-60-M

A-B QUALITY

TYPE BR Bulletin 700 convertible contact relay shown with four poles. Made with up to six poles in line.

No other relay offers such simplicity in changing contacts from N.O. to N.C. (or vice versa)—it takes only 60 seconds!

A four pole unit provides any of the contact combinations otherwise available only with five relays of the fixed contact type. You can reduce your relay inventories. In tests, this relay has *proved* it will provide many millions of trouble free operations. Double break, silver contacts never need servicing. Also, each relay can have one or two complete and full rated contacts added to its base—in the field—without increasing space requirements. If you don't know about the Type BR relay, let's get acquainted.

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley, Canada Ltd., Galt, Ontario

ALLEN-BRADLEY

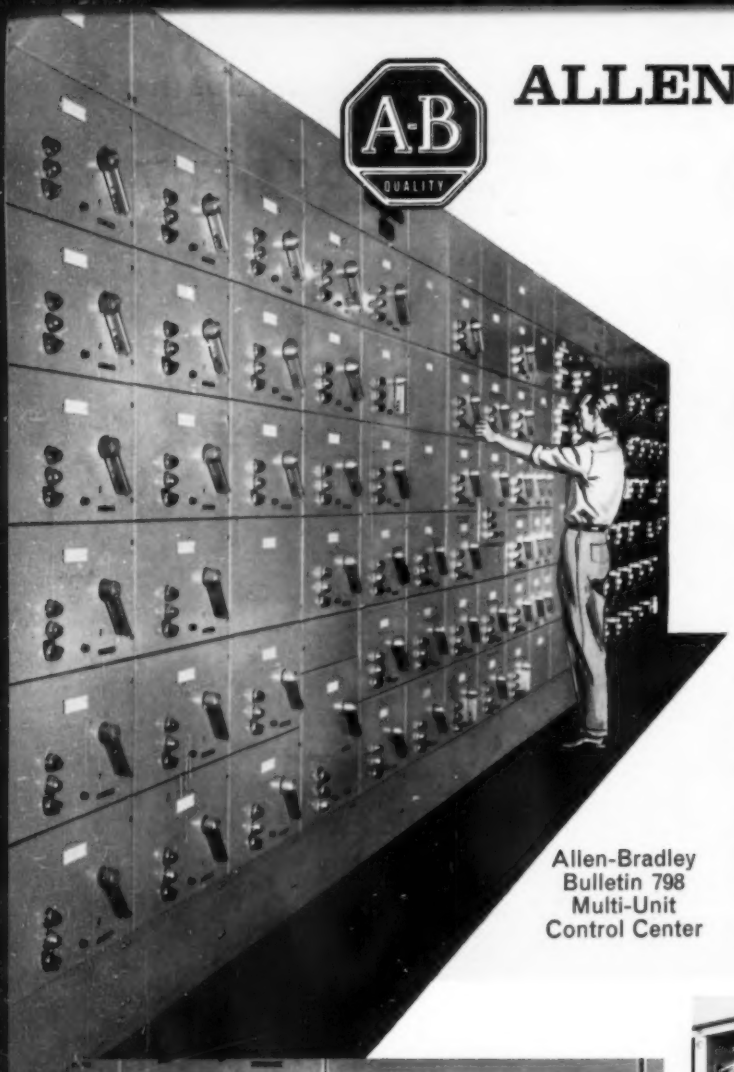
Quality Control Centers

...the mark of a modern plant providing the utmost in reliability, safety, convenience, and lasting beauty

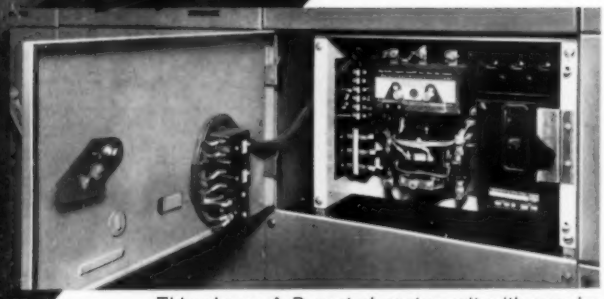
The superior *quality* of Allen-Bradley control centers provides a modern and attractive installation—one that you'll be justly proud to have in your plant. The cost is commensurate with the quality of the workmanship—but you'll never have reason to regret your decision. Furthermore, Allen-Bradley control centers arrive completely wired and tested—and *installed* costs are usually substantially lower than that of individual starters.

The flexibility of A-B control centers makes them readily adaptable to changing needs. Individual units can be added or modified without internal rewiring. In addition, entire sections can be added to meet future plant expansion.

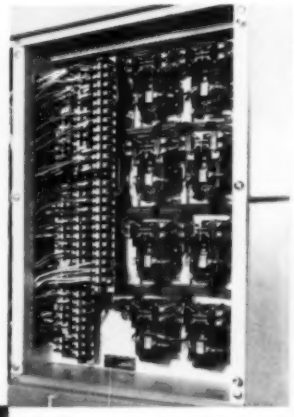
For the finest in control centers, you cannot surpass Allen-Bradley's Bulletin 798. Write today.



Allen-Bradley Bulletin 798 Multi-Unit Control Center

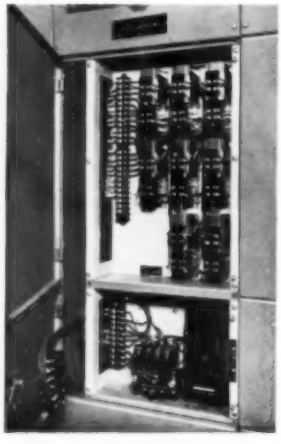


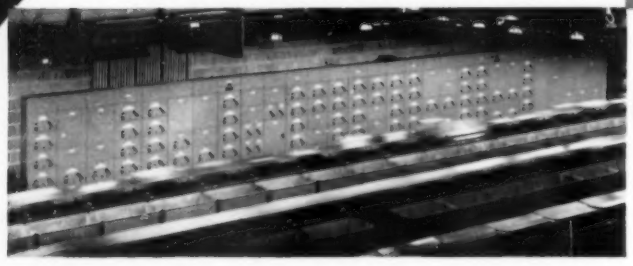
This shows A-B control center unit with popular A-B Bulletin 709 solenoid starter and circuit breaker.



This shows A-B Bulletin 700 control relays mounted in an A-B control center unit.

A-B control centers can be equipped with a wide variety of components. These Bulletin 849 timers are used on an automatic conveyor line.





This huge, 48-foot A-B control center houses 101 A-B Bulletin 709 solenoid motor starters. It is designed to permit an addition containing 50 more Bulletin 709 starters.

ALLEN-BRADLEY

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QUALITY MOTOR CONTROL

Oven and dryer building made easier!

J-M MARINITE® *is both oven wall and insulation in one workable material!*

To build the most efficient ovens and dryers you've ever operated, all you need is one material: Marinite. J-M Marinite is a rigid insulating material that also serves as your oven and dryer wall. You build and insulate (up to 900F) in *one* operation with *one* material. Marinite is an unequaled combination of efficient insulation and structural strength. It costs you no more in place than other materials, and saves you time and effort.

HERE'S WHY:

MARINITE IS WORKABLE. It cuts easily. Your own shop can prefabricate panels from large 4′ x 8′ or 4′ x 10′ sheets with standard saws and drills . . . and assemble them quickly. Rigid Marinite requires a minimum of structural support.

MARINITE CUTS MAINTENANCE. Your ovens require little or no maintenance because Marinite lasts indefinitely. It will never rust, rot or corrode. It is made of asbestos fiber, diatomaceous silica and an inorganic binder. It will not disintegrate even in the most humid, moist conditions. Paint Marinite if you wish—but painting isn't necessary.

MARINITE INCREASES EFFICIENCY Marinite's low conductivity saves fuel and cuts heat loss so effectively that you can gain comfortable extra working space nearer your ovens. There's no through-metal except for a few necessary bolts, and staggered-joint construction keeps your insulating effectiveness high. No "hot-spots" caused by soft insulations that settle and sag—solid Marinite *stays put!*

FIREPROOF MARINITE has Fire Underwriters' approval. For constructing ovens, dryers and other insulated housings—you just can't find a better material than dual-purpose Marinite. Complete information in our Brochure IN-153A. Write to Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario.

BENCH TYPE CIRCULAR SAW *makes straight cuts. Use heavy-duty portable power saw for small jobs.*

PORTABLE POWER DRILL *and templet insure easy drilling and accurately placed holes.*

CIRCULAR CUT-OUTS AND DISCS *are fly-cut with a radial power drill. Make other cut-outs with portable power saws.*

JOHNS-MANVILLE

AN INSULATION FOR EVERY COMMERCIAL AND INDUSTRIAL USE.

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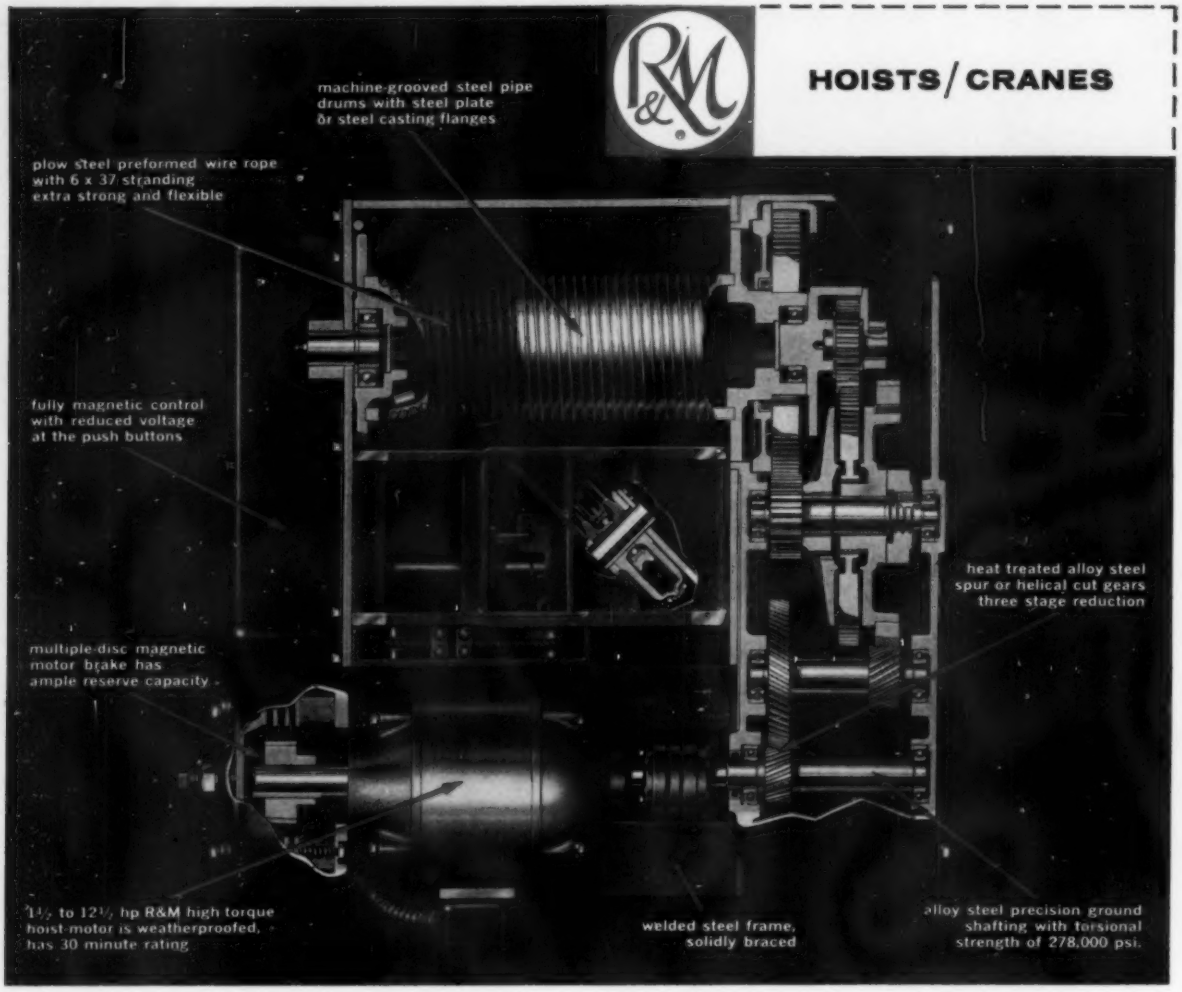
machine-grooved steel pipe drums with steel plate or steel casting flanges
plow steel preformed wire rope with 6 x 37 stranding extra strong and flexible
fully magnetic control with reduced voltage at the push buttons
multiple-disc magnetic motor brake has ample reserve capacity
1½ to 12½ hp R&M high torque hoist-motor is weatherproofed, has 30 minute rating
welded steel frame, solidly braced
heat treated alloy steel spur or helical cut gears three stage reduction
alloy steel precision ground shafting with torsional strength of 278,000 psi.

R&M

HOISTS / CRANES

LOW HEADROOM HOIST FOR HARD USE

Robbins & Myers heavy duty Type F hoists have compact, beam-hugging profiles to save overhead space in your plant. For example, the F-2 has a headroom of only 17", yet provides 2 ton lifts on a path of steel extending from beam to hook. And F hoists are built for toughest use: frame is welded steel, alloy steel gears are heat treated, ball and roller bearings are used throughout. Weatherproof R&M 220/440 v.a.c. motors—to 12½ hp—drive through three gear reductions. These are the hoists to choose for day-after-day production lifting where maximum dependability is important. You can standardize on F hoists throughout your plant because the line is as economical as it is broad: capacities—½ to 10 tons, mounting—lug, plain or geared hand trolley, 3 types of motorized trolleys. Request Bulletin 920. Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio or Brantford, Ontario.

Type F hoists: over forty speed-load choices.

ROBBINS & MYERS

hoists & cranes, Moyno® pumps, motors, Propellair® fans

For more facts circle 525 on Reply Card

MOYNO®
PUMPS

Let MOYNO'S® *"Progressing Cavities"* Cut your Pump Maintenance Costs!

MOYNO's unique *"progressing cavity"* principle cuts pump maintenance costs because material being moved contacts only one moving element. MOYNOS are constructed to stoutly resist corrosion and abrasion. As shown in the cutaway model above, MOYNO's screw-like rotor revolves in a double-threaded stator forming *"progressing cavities"* that move material smoothly along, without foaming, aerating or crushing. Even where duty is so torturous that rotor and stator must be made of special resistant materials, MOYNO parts show little wear.

In industry everywhere, and on OEM applications, MOYNOS are proving "if it can be pushed through a pipe . . . MOYNO will pump it!" Typical materials pumped include non-pourable pastes, abrasive slurries, chemicals, foods, acids, even suspended solids up to one inch in size. Many materials now successfully pumped by MOYNO were once considered "unpumpable" . . . had run up prohibitive maintenance costs on other type pumps or ruined them completely.

Capacities are available up to 500 gpm and pressures up to 1000 psi. Off-the-shelf replacement parts are always immediately available. No doubt your plant flowsheet or OEM product has a spot where MOYNOS can cut costs drastically. To find out how, write today for Bulletin 30-PE!

ROBBINS & MYERS, INC.

motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps

SPRINGFIELD, OHIO • BRANTFORD, ONTARIO

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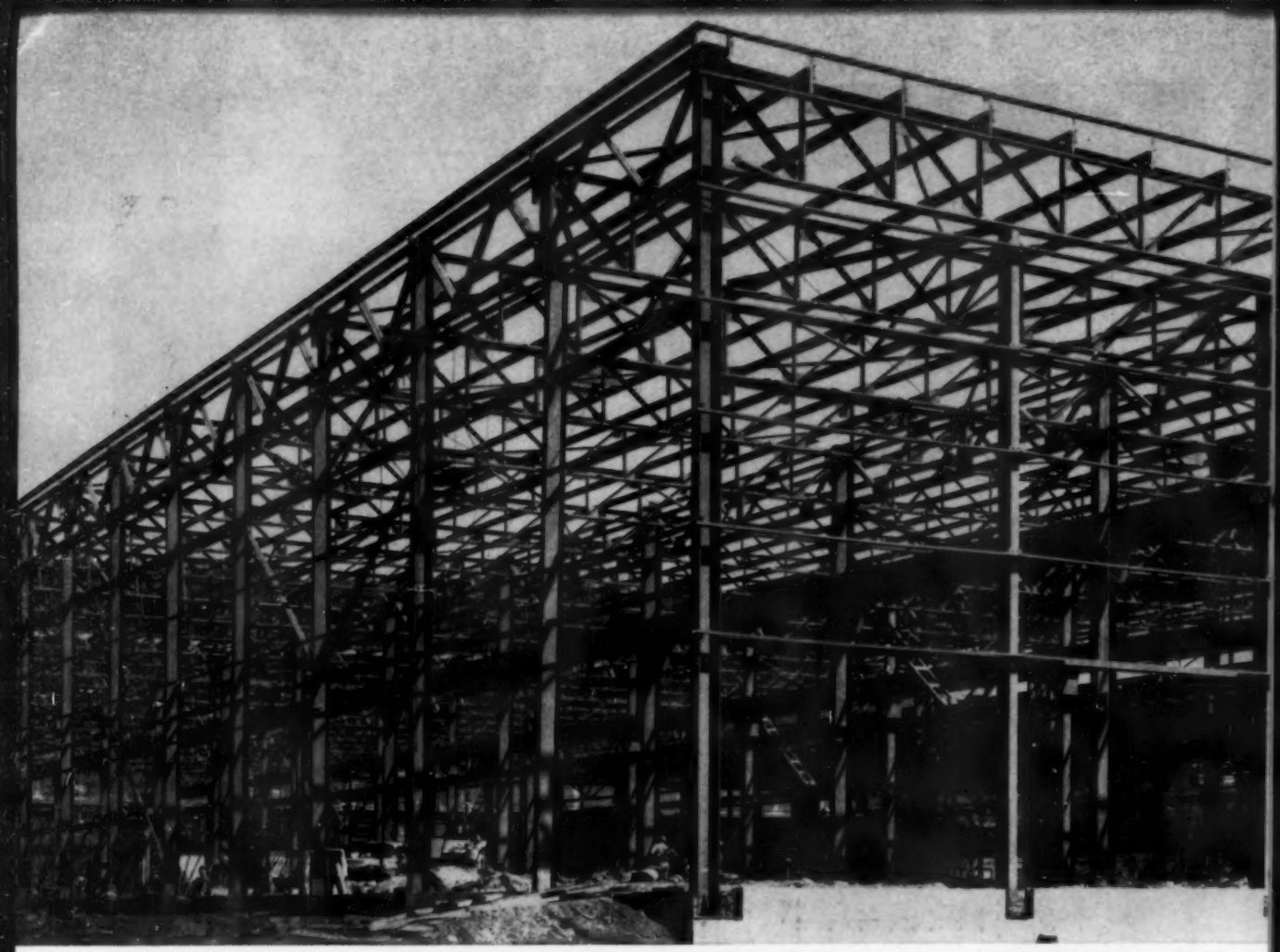
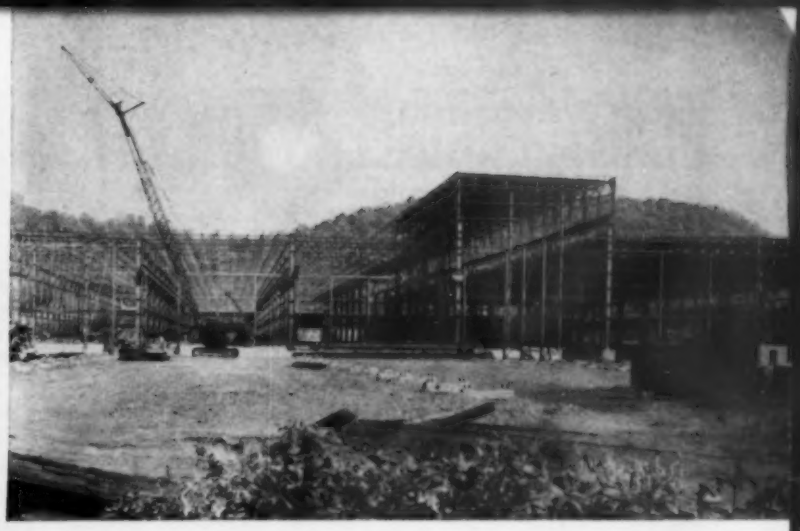
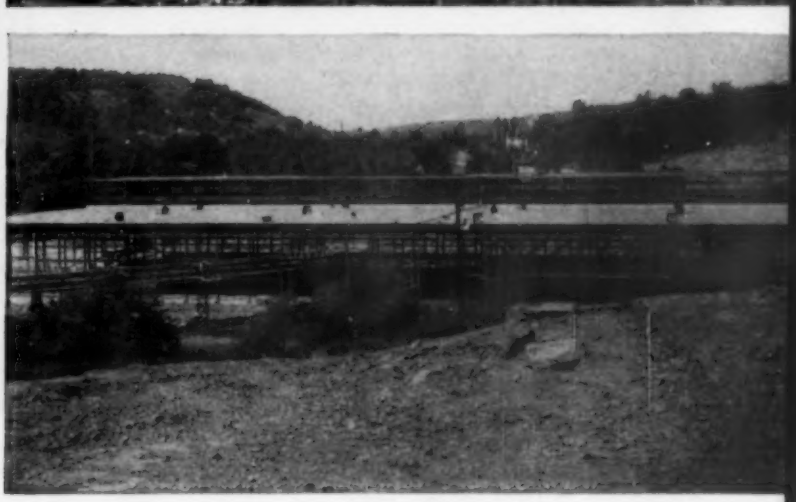


Kaiser Engineers, General Contractor and Engineer, Oakland, Calif.

New Westinghouse Plant





fabricated and erected by American Bridge

Recently, American Bridge constructed a new Power Circuit Breaker Plant and Exterior Crane Runway at Trafford, Pennsylvania for the Westinghouse Electric Corporation. The building measures 420′ x 584′, the crane runway 334′ x 116′2″ and the entire job took 2,576 tons of steel. All connections were made by bolting and welding. ☐ Structural steel is ideal for industrial construction because its ease of fabrication permits complete design freedom. Structural steel also assures utmost strength and safety at a very reasonable cost. For your future industrial buildings, contact the nearest American Bridge contracting office for the facts on our services and facilities.

USS is a registered trademark

General Offices: 525 William Penn Place, Pittsburgh, Pa.
Contracting Offices in: Ambridge • Atlanta • Baltimore • Birmingham • Boston • Chicago • Cincinnati Cleveland • Dallas • Denver • Detroit • Elmira • Gary • Harrisburg, Pa. • Houston • Los Angeles Memphis • Minneapolis • New York • Orange, Texas • Philadelphia • Pittsburgh • Portland, Ore. Roanoke • St. Louis • San Francisco • Trenton • United States Steel Export Company, New York

American Bridge Division of United States Steel

USS

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST—so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Lamps for Cold Locations

AT LEAST TWO locations in the country are so cold that even fluorescent lamps must wear "overcoats." Both locations are cold storage plants, one in Florida, the other in Ohio. In each, sub-zero temperatures are maintained for the protection of frozen foods.

Glass-jacketed fluorescent lamps, which deliver peak light output at —20 F, outdoors or indoors, are employed in the two plants to provide adequate lighting levels.

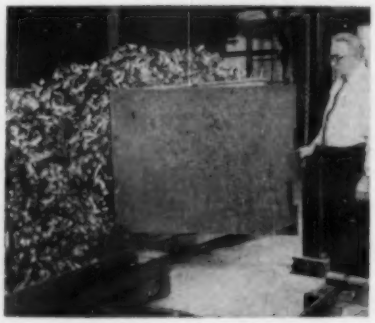
Earlier types of fluorescent lamps had not been able to perform with normal efficiency when exposed to low temperatures. At zero degrees Fahrenheit, some types deliver only 10 per cent of their rated output.

Plantation Cold Storage of Miami found this out after replacing incandescent lamps with a fluorescent system. They first tried one fluorescent type then another without getting adequate light levels.

Solution to the problem came when the company received an installation of jacketed fluorescent lamps. Fourteen unenclosed lamps of the outdoor type now provide twice as much light, with one-third the heat, as was produced by the original lighting system which employed incandescent lamps. *From a release of General Electric Co., Cleveland, Ohio.*

Easy Scrap Handling

HANDLING OF stainless steel chips has been improved in our plant by loading them in metal containers.



Metal container is used to haul stainless chips from plant to scrap storage.

Under the old method, the chips were transferred from the Finishing Department at Gambrinus to the plant's scrap storage yard. From there, they were loaded into trucks by a locomotive crane and hauled about one mile to the crushing machines.

Six men removed the chips with rakes by dragging them from the truck to the crushers, a distance of about 40 ft. This operation could not be performed during the regular work schedule because it required so much floor space.

With the new method, chips are deposited in special metal containers at the Finishing Department and hauled by straddle carriers to a special unloading dock adjacent to the crushing machines. An electric lift platform truck then picks up the container and carries it to the crushers where it is opened and emptied. The encasement of steel chips permits this job to be performed during regular operating time of the department.

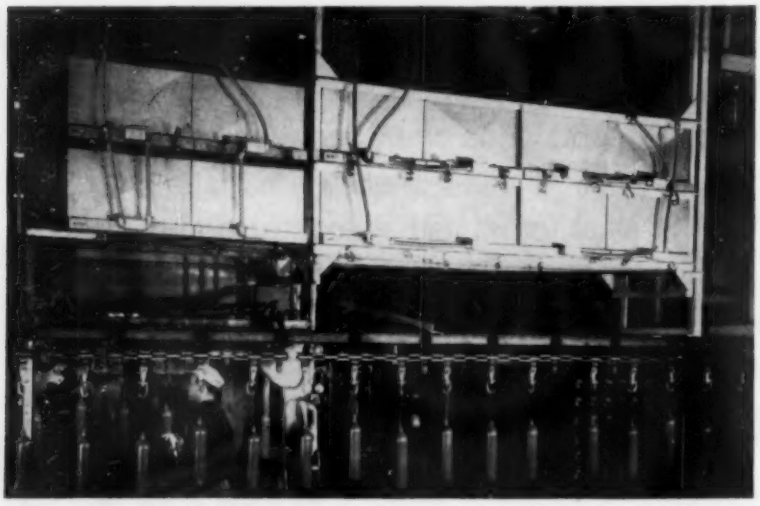
Use of the locomotive crane and the trucking and the extra handling to and from the storage yard has been eliminated, and efficiency increased by reducing handling time, not only in the transportation but also in the crushing operation. *From a release of Timken Roller Bearing Co., Canton, Ohio.*

Fire-Extinguishers Painted in 28 Colors Dried at Steady Rate

THE PROBLEM OF DRYING 28 different hues of paint on fire extinguishers without slowing production, was solved at the American La-France Corp., Elmira, N. Y., by installing 24 Pyrex radiant panel heaters.

Wired in parallel, the panels form a drying tunnel 12 ft long and 30 in. wide. Conveyor speeds were doubled and electricity consumption halved.

Before the panels were installed, drying was difficult. Conveyor speeds had to be continually juggled for the 28 different colors and operators had to guard against burning the lighter colors. Production losses ran between 30 and 40 per cent. *From Gaffer News, published by Corning Glass Works, Corning, N. Y.*



Fire extinguishers in 28 colors move steadily through tunnel of heating panels.

Making Floors Slip Resistant

A POTENTIALLY HAZARDOUS floor surface in its press room "wash-up" area was made safer by The Caslon

(Continued on page 46)

For more facts circle 527 on Reply Card

"Explosion-proof EXIT *signs!*

Where do you expect me to get them ?"

As you can see, they found the explosion-proof exit sign. It's Crouse-Hinds No. EVA139.

Look in your Crouse-Hinds catalog, of course. There's nearly everything you could want for hazardous areas listed there. Nine different types of explosion-proof telephones... horns, bells, clocks, pilot lights, instrument enclosures, gauge lights. Even X-Ray film illuminators. And, of course, modern designs in all the familiar explosion-proof motor controls, switches, plugs, receptacles, panel boards and lighting fixtures. UL-listed for every Class and Group in Article 500, National Electrical Code.

So, whether you're looking for conventional or out-of-the-ordinary explosion-proof electrical devices, contact Crouse-Hinds. If you design, buy or work with hazardous-area equipment, a Crouse-Hinds catalog should be on your desk. Ask your Crouse-Hinds Representative.

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For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

Abrasive is sprinkled over bonding resin, to make floor slip resistant.

Press, Inc., Pittsburgh, through the use of a non-skid compound that resists slip effects of leather-soled footwear.

The 150-sq-ft area is used for hand washing and for washing out sponges and rags used for cleaning. Often a considerable amount of water is splashed on the concrete floor.

Although there had been no falls, the concrete was smooth and, when wet, slippery. The answer to this problem was the use of a bonding resin impregnated with grit. The grit particles provide the non-skid surface.

An initial coating of the compound was applied to the floor and abrasive particles sprinkled over it. After being allowed to dry for an hour, excess grit was swept off and a second coat of bonding mix applied. The surface cured to permit light traffic in six hours' time, and heavy traffic in 16 hours. *From a release of Mine Safety Appliances Co., Pittsburgh, Pa.*

Cleaning Precision Parts

MORE EFFICIENT cleaning, no intermittent heating of cleaning solutions and the consequent ability to use volatile solutions to speed air drying of precision air capacitors, are the advantages gained by using ultrasonic cleaning methods at Johanson Mfg. Corp., Boonton, N. J.

The ultrasonic cleaning equipment, which consists of a tank and transducer combination and a generator which transforms conventional 110 v a-c current into high frequency oscillations, handles many types of variable air capacitors, some no larger than a fingernail.

To ensure proper performance of these components, all soils must be

Intricate concentric-tube-type capacitor is cleaned efficiently with ultrasonics.

removed, as well as tiny burrs and chips resulting from machining, without damage due to excessive handling. The difficulty is compounded by the softness or brittleness of the materials used.

Formerly parts were soaked in boiling detergent, then swabbed or brushed to remove all contaminants. After rinsing, the capacitors were dried with an air hose. This method often damages the parts and the high-pressure air often redeposited more dust than was eliminated by cleaning. *From a release of Branson Ultrasonic Corp., Stamford, Conn.*

Galvanized Protection for Insulation

USE OF GALVANIZED steel sheets for covering the insulation on boilers, ducts and other steam generat-

(Continued on page 48)

No-Yoke Portable Dimpling Tool Operates in Hard-To-Get-At Areas

A LIGHTWEIGHT two-stage portable dimpling tool, designed to operate in areas formerly inaccessible to ram-coined dimpling equipment, has been developed by our Aero-Space Division in Seattle. Hydraulically operated, it weighs 6 lb and can be operated with heated dies. The tool is now in prototype form.

Instead of a conventional C-yoke, the tool utilizes a high strength tool steel mandrel with dependable yield strength in excess of 230,000 psi to withstand forming pressures in the range of several tons. A clamping assembly is slipped onto the mandrel from the inside of the material to be dimpled. The design of the mandrel facilitates rapid replacement when changing to various dimple diameters.

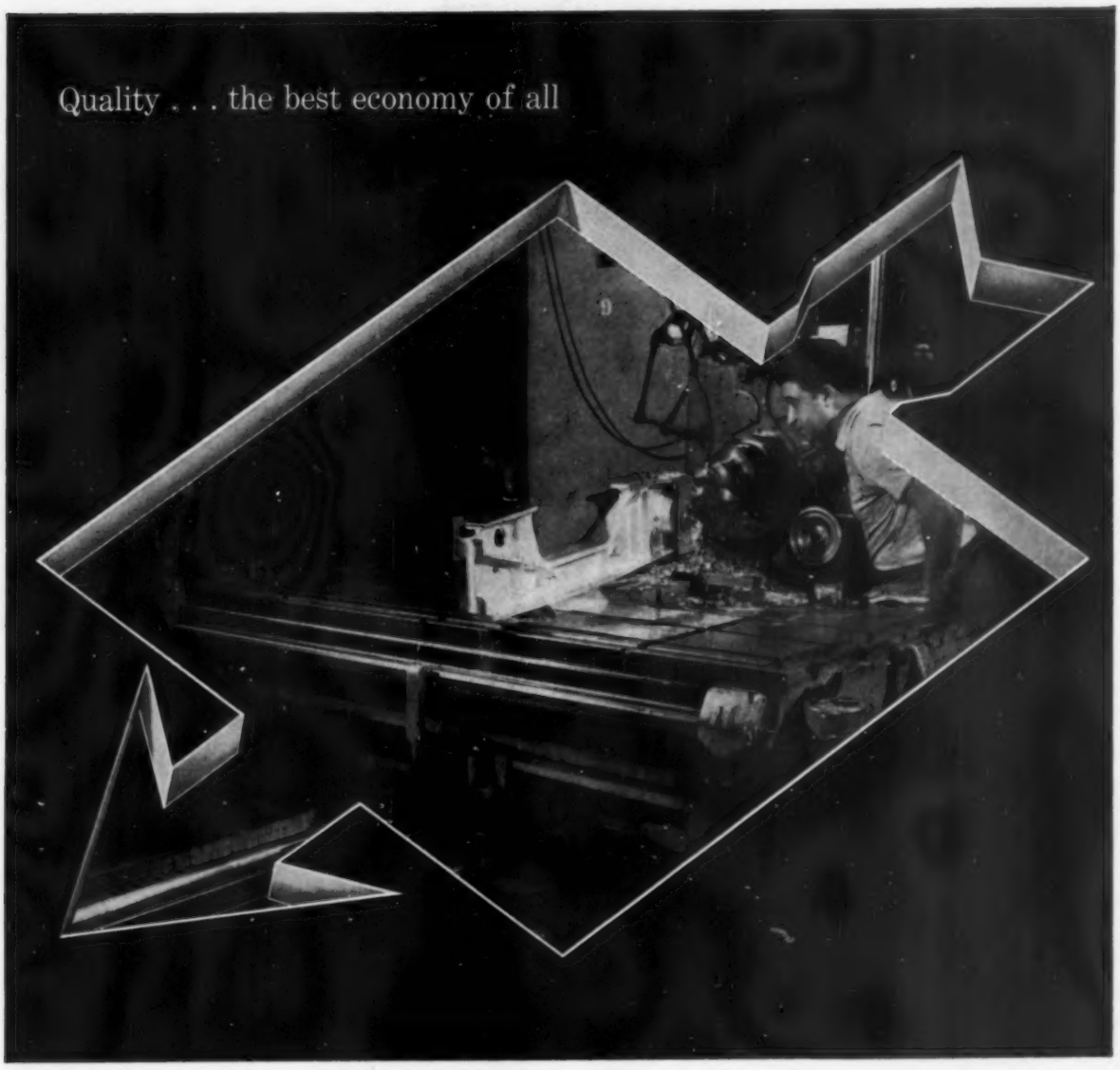
At Boeing, the new tool eliminates the necessity for removal of airframe skins, in final assembly and

New dimpling tool utilizes steel mandrel instead of C-yoke, is portable.

during modification and repair work, to perform dimpling operations formerly inaccessible with portable C-yoke dimplers. It has been used to form dimples for 5/32 to ¼-in. diameter fasteners in 0.020 to 0.050 and 0.020 to 0.064-in. 7075-T6 and 2024-T4 aluminum alloys, respectively.

Design features of the new tool include a clamping assembly split-nut-collet-chuck that fully engages extremely shallow threads on the mandrel to permit high tensile loading.

The dual action of the hydraulic unit produces a clamping force in one direction and forming force in the opposite direction. *From a release of Boeing Airplane Company, Seattle, Wash.*



Fight the cost of "Stick-Slip" with Sunoco Way lubricant

"Stick-slip", the alternate grabbing and releasing of slow-moving carriages, can seriously score machine ways and ruin fine workpiece finishes.

Avoid this trouble and expense with Sunoco Way Lubricant, known throughout the world for its ability to cure "stick-slip". Special ingredients in Sunoco Way Lubricant form a durable, reinforced lubricating film along the mating surfaces. Result: There is no metal-to-metal contact even during week-end shutdowns; machines start easily; carriages move without intermittent grabbing. YOU GET FINER FINISHES, FEWER REJECTS.

Ask your Sun representative to show you how others have benefited by using Sunoco Way Lubricant. Or write to Dept. PY-9. SUN OIL COMPANY, *Philadelphia 3, Pa.* In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

For more facts circle 529 on Reply Card

Atwood Vacuum Machine Company, Rockford, Ill.—showing its re-siding of 4" Ribbed Embossed.

FOR NEW LIFE
AND A BRIGHT NEW LOOK...

REYNOLDS ALUMINUM

Commercial Roofing and Siding

When maintenance men use Reynolds Aluminum to re-cover *other siding that did not stand up* . . . that's evidence of superior rating. For new or old installations, Reynolds Aluminum siding guarantees absolute freedom from rust plus exceptional resistance to corrosive industrial atmospheres.

Reynolds Aluminum roofing completes a building exterior which is practically maintenance-free and which also *reflects radiant heat* . . . improving the comfort of workers the year around, and cutting the costs of heating and air-conditioning.

Available in Corrugated, 4" and 8" Ribbed Embossed, V-Beam and Roof Deck . . . all in natural aluminum *and in 20 New "Colorweld* 60" Colors,* embossed or mill finish. These materials also combined in Field Assembled Insulated Wall Systems. For full information call any Reynolds sales office. Or write to **Reynolds Metals Company,** Richmond 18, Virginia.

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Watch Reynolds TV Shows: "BOURBON STREET BEAT" and "ADVENTURES IN PARADISE"; and, resuming in October, "ALL STAR GOLF"—ABC-TV.

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

Galvanized steel sheets cover insulation on steam generating equipment.

ing equipment, has solved problems inherent in the traditional method of lagging at the Thomas H. Allen Electric Generating Station in Memphis, Tenn. The half-million square feet of galvanized sheets used for the job were shown to be easily fabricated and competitive in cost with traditional materials.

The galvanized sheets will not be subject to cracking nor will they be vulnerable to considerable damage.

Special treatment of the sheets permitted their immediate painting while retaining the corrosion protection of the zinc coating. *From a release of Committee on Galvanized Steel Sheet Research, N. Y., N. Y.*

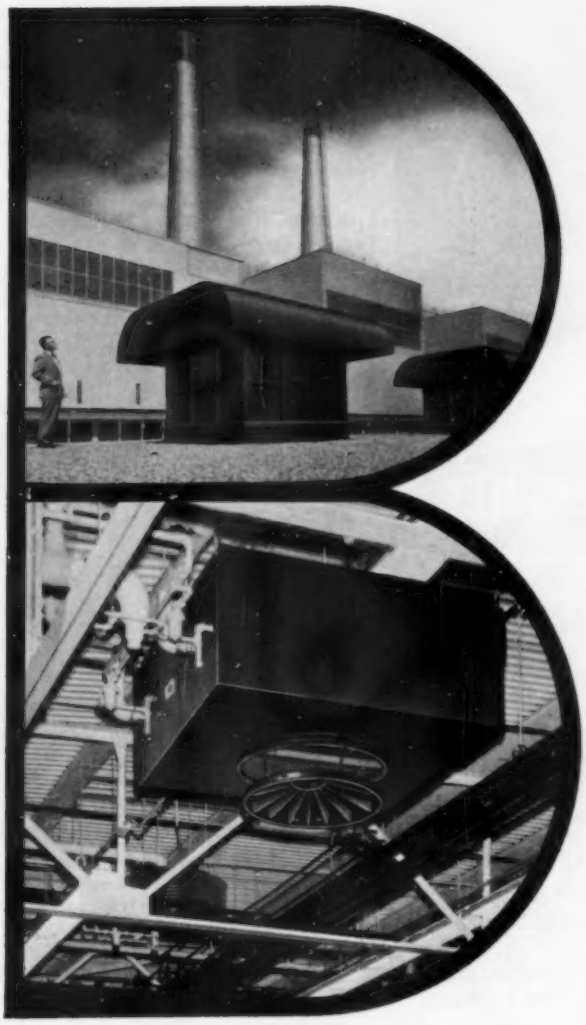
Air Clutch Helps Reduce Maintenance Raises Production

SWITCHING FROM mechanical clutches to air-actuated units on hot heading punch presses has provided major improvements in machine control, component service life and operational safety at Voi-Shan Manufacturing Company, Culver City, Calif. Voi-Shan, producer of high-precision fasteners for aircraft and missiles, reports a production increase of 20 per cent and a decrease in maintenance costs of 80 per cent as a result.

When the company embarked

BUFFALO PACKAGE UNITS

VENTILATE LARGE AREAS AT LOW COST



1 EXHAUSTING THRU THE ROOF—the best way to remove fumes, dust, vapors and stale air from large working areas where ducts are not feasible. Buffalo Power Roof Ventilators like this Style "H" Sky-Vent are easily-installed, weatherproof "packages" that do the job to perfection. Just mount in roof opening over areas to be ventilated — your own maintenance staff can do it! Gain further savings thru Buffalo efficiency and freedom from troubles. 12″ to 120″ wheel sizes (1000 to 250,000 cfm) for any ventilation job you may have. Write for Bulletin FM-2345 for all details.

2 REPLACING EXHAUSTED AIR WITH FRESH, CLEAN AIR. Buffalo Makeup Air Units like this ceiling installation draw in fresh outside air, heat it, filter it and distribute it properly — replacing air and heat removed by exhaust systems or forced draft fans. Buffalo builds a complete line of Makeup Air Units, including Heating and Ventilating Units and "PC" Cabinets for simplified installation thru roofs or outside walls. Capacities and designs to suit your needs, quality construction to give you trouble-free satisfaction at lowest operating costs.

Buffalo makes Fans and Central System Air Conditioning Units to match the many variations in ventilating requirements from plant to plant. For suggestions on your specific problem, consult your nearby Buffalo representative.

"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

For more facts circle 531 on Reply Card

Cost Conscious Companies Confirm that...

for Electrical Distribution or Test Needs

the Sensible Solution is

CUSTOM-DESIGNED *flexlab*®

EQUIPMENT by STANDARD

Realistic plant engineers recognize that, for design and construction of specialized equipment like this, it's good sense to rely on a qualified outside source.

By cooperating with a company like Standard, the harried plant engineer is freed of much troublesome detail... finds more time to turn his talents to his many other responsibilities.

Standard engineers will be glad to consult with you and offer recommendations. And whether the solution is a small power pack or a million dollar, multi-building installation, Standard has the skills, experience and facilities to design and produce—completely—the equipment to meet your requirements.

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Request Catalog No. 247 describing Standard industrial panels and consoles.

THE STANDARD ELECTRIC TIME CO.

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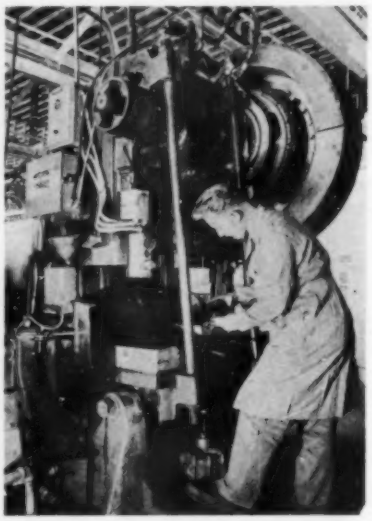
PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

on a press modernization program, they replaced not only the mechanical clutches but also the brake and control systems. This was accomplished on each of six presses with a standard press modernization package, consisting of a constricting type air clutch; a spring-engaged, air-released brake; high speed electro-pneumatic controls; and new flywheels with anti-friction bearings.

With former power transmission systems it was found that total machine control began to slip as the clutches grew older. This was hazardous to press operators, since



Modernization package for power transmission system has air clutch, air brake, electro-pneumatic controls, flywheels.

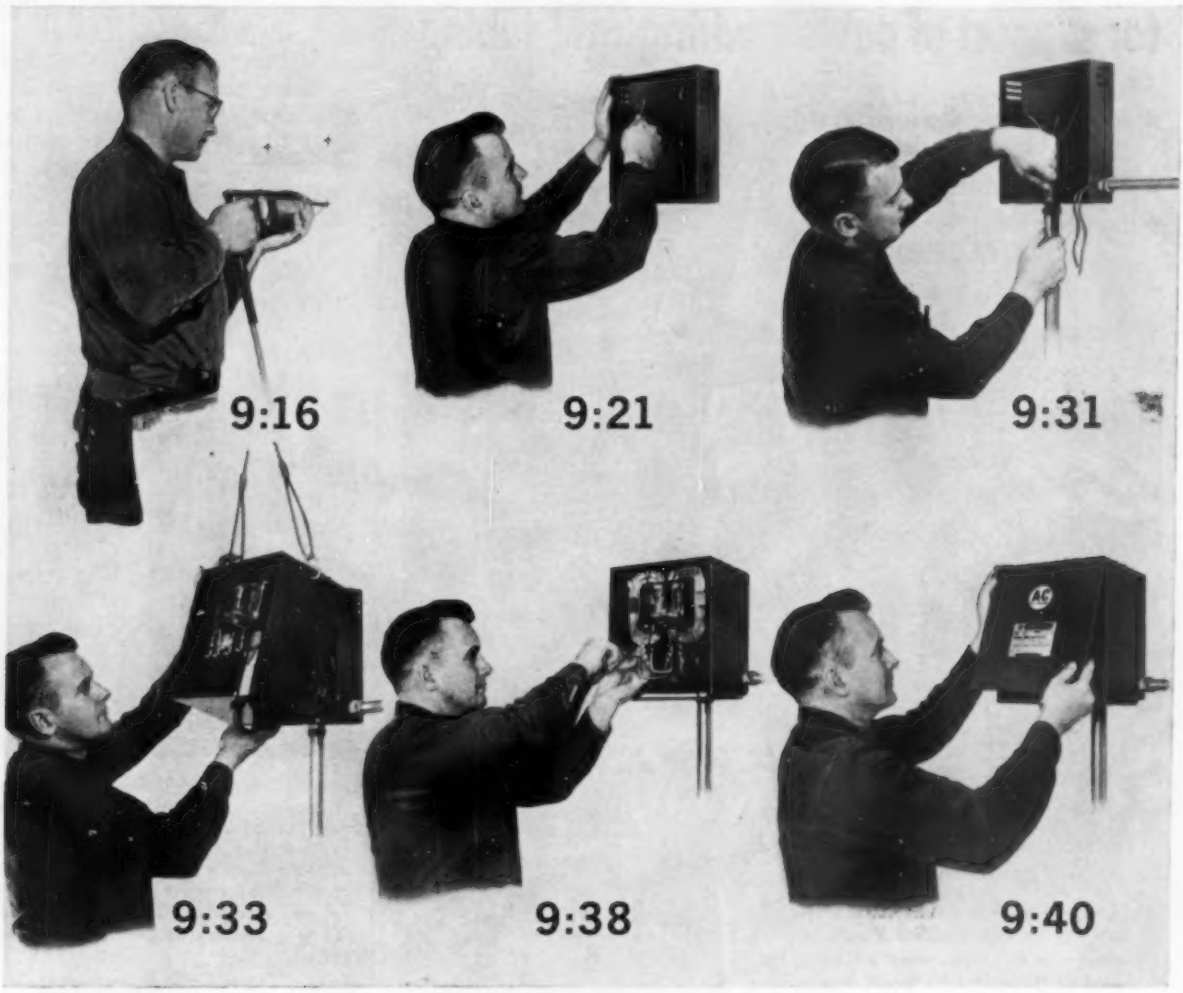
cycle timing must be exact. The maintenance costs involved in guarding against accidental re-cycling became excessive.

The air clutches are automatically self-adjusting for wear, providing instantaneous torque transmission without repeats or slippage. Pushbutton control makes setups easy and exact, and cycle timing is precise. Close tolerances are maintained throughout long or short production runs.

Another advantage of the new clutch and brake package is elimination of backlash. Starting and stopping are instantaneous, yet smooth. This has resulted in longer die life and greater machine preci-

ALLIS-CHALMERS

A-1360



9:16 — 16 minutes to drill 4 holes in concrete wall and add lead inserts to receive screws. **9:21** — 5 minutes to mount back panel to wall. **9:31** — 10 minutes to punch out knockouts and attach conduit. **9:33** — 2 minutes to put center case section in place and tighten side screws. **9:38** — 5 minutes to pull cables and connect to terminals. **9:40** — 2 minutes to fasten front panel to center section with side screws. **Installing time: 40 minutes instead of the usual hour and a half!**

35% smaller, lighter, new whisper-quiet dry-type transformers

cut installing time in half!

New A-C design eliminates common installation problems! Unique 3-piece case makes handling, wiring go like clockwork. 35% smaller and lighter, you can install them in 40 minutes instead of the usual 90 minutes.

And they're whisper-quiet. Every known factor in subduing noise has been incorporated . . . core impregnation, core and coil assembly suspension isolated from case . . . plus use of nonresonate casing. Exclusive *Curvacore* construction lowers exciting current, core losses.

This new 600-volt class indoor dry-type transformer line is available in sizes 3 to 50 kva . . . for on-the-site load center applications where critical voltage must be maintained.

See your nearby A-C office for details or contact **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*

Curvacore is an Allis-Chalmers trademark.

For more facts circle 533 on Reply Card

NOW···GLOBE OFFERS···
two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER installation
★ No sharp edges to damage cables
★ Complete interchangeability

Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities— consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.

109

PRODUCTS DIVISION

The **GLOBE** *Company* MANUFACTURERS SINCE 1914

4016 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

sion, while substantially reducing tool and die maintenance costs.

Voi-Shan also points to low clutch maintenance as a major improvement over former systems. There is only one moving part—the rubber actuating tube which expands or contracts to engage or disengage the friction shoes with the clutch drum. *From a release of Fawick Airflex Div., Fawick Corp., Cleveland, Ohio.*

Quick Change Rack

Rack using slip-on fittings holds frame channels at Ryan Aeronautical Co., San Diego, Ca'if. Because no welding or threading is needed and fittings are installed very easily with hex wrench, rack can be changed to suit any job. (From a release of The Hollaender Manufacturing Co., Cincinnati, Ohio.)

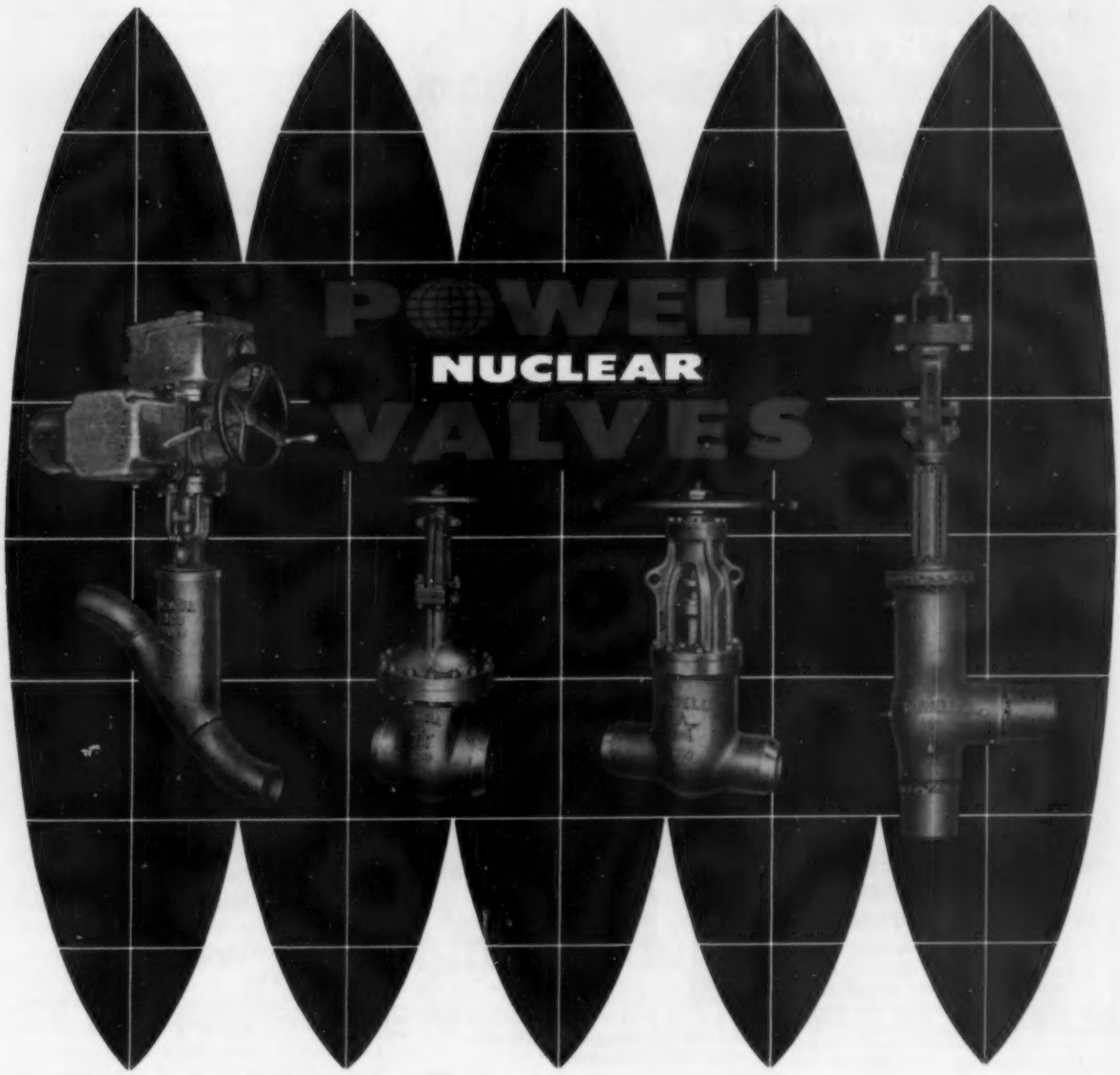
Fabric Tanks Help Maintenance

LARGE COLLAPSIBLE tanks made of rubberized fabric are being utilized instead of metal drums and tanks to store oil during periods of repair and routine overhaul of electrical substations.

Hundreds of gallons of oil must be drained from circuit breakers and transformers before any work can be performed on their integral parts. Until the fabric tanks were used, oil had to be drained into individual 50-gal drums or truck-mounted metal tanks. At the completion of the job, the oil must be pumped back into the unit.

Since many substations are in remote areas, and inaccessible to tank trucks, the collapsible tank, compactly rolled and carried in the back

Performance makes the world of difference



*4-inch steel Bell-O-Seal "Y" valve for 300 pounds pressure.

Fig. 3003 W. E.—Steel bolted bonnet gate valve for 300 pounds W. P. Bolted bonnet valves can be supplied for pressures from 150 through 2500 pounds.

Fig. 19003—Steel pressure seal gate valve for 900 pounds pressure. Also available in 600, 1500, 2500 pounds W.P.

*3-inch steel, Bell-O-Seal Freeze Seal angle valve for 150 pounds pressure.

*These two valves are specifically designed and made to provide absolutely leak-tight control of liquid metals in the reactors of nuclear power plants.

Keeping pace with nuclear advancements — Powell manufactures valves to handle molten metals and other radioactive materials in atomic power plants—vital and hazardous materials which must be contained in and pass through the valves without the slightest leakage or failure.

Painstaking quality control is rigidly enforced in each step of manufacture of these important valves. Test facilities and inspection meet the most exacting specifications. For complete information on Powell nuclear valves, consult your nearest Powell valve distributor or contact Powell directly.

Powell . . . world's largest family of valves

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

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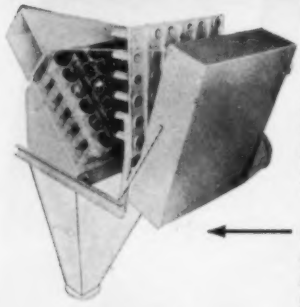
THERE'S THE RIGHT KIND OF DUSTEX COLLECTOR for every dust problem*



DUSTEX CENTRIFUGAL COLLECTORS →

D-584 with 100% efficiency at 14 microns

D-560 with 100% efficiency at 12 microns

for economical separation of dust from normal or high temperature gas or air.

← **MICROCLONE**

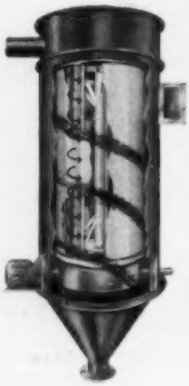
with 99.8% efficiency at 10 microns and smaller for ultra-high efficiency and installations requiring strict sanitation . . . easily cleaned and sanitized thanks to convenient hinged top tube sheet design.

For Many Ordinary Dusts

New, Low-Cost DUSTEX "1600" brings a higher Dustex Performance to collectors in Lower Price Range.

DUSTEX ROTO-JET CLOTH COLLECTOR →

Dustex Engineering eliminates usual cloth problems through a completely new design . . . drastically lowers operating and maintenance costs.



THE BIG DIFFERENCE

IN CENTRIFUGAL COLLECTION

Dustex Exclusive Patented Design

- Unobstructed inlet plenum avoids material buildup and plugging.
- All tubes are surrounded by cleaned gases and maintained at system temperature to forestall condensation and plugging when systems are above dew point.

IN CLOTH COLLECTION

Revolutionary Dustex Advances

- Preliminary separation of dust reduces cloth load.
- No reversing mechanisms.
- Unique controlled wrap prevents cloth jamming.
- Cloth changes easier . . . less frequent.

For all Hopper and Bin Discharges

(Under Negative Pressure)

DUSTEX VACUUM VALVE

No motive power required.
No mechanical parts.
Maintenance free.
Bolt in place and forget it.

ON THE JOB DETERMINATION TEST YOUR BEST GUARANTEE

The Dustex Single Tube Determination Test, performed under actual operating conditions, provides exact data with which to specify equipment. No cost or obligation.

SEND FOR "A Simplified Test Method", illustrated booklet describing the Dustex Single Tube Determination Test in detail.

Details and specifications for every model available on request.

DUSTEX PATENTED FEATURES ARE THE BASIS FOR DUSTEX SUPERIOR PERFORMANCE

*It will pay you to learn why Dustex has so successfully handled so many process dusts where other collectors have failed.

• *The company with the big name in dust collection . .*

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For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

Collapsible tanks save maintenance manhours in draining oil from equipment.

of a pickup truck, provides a practical solution to the problem. Use of the new tanks cuts by almost two-thirds the time required to drain and refill large power units. *From a release of Goodyear Tire & Rubber Co., Akron, Ohio.*

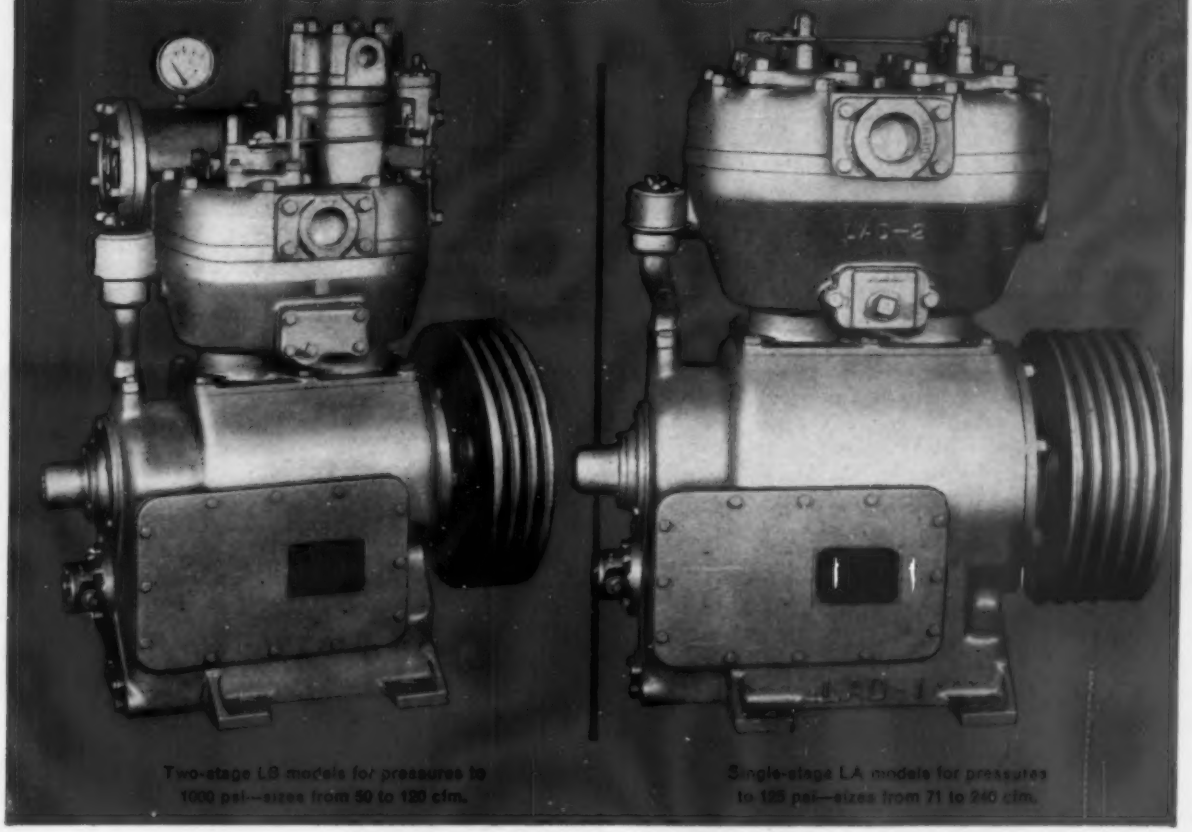
Touchup With Air Brush

IMPROVED TOUCHUP work has been achieved at DC Reinforced Plastics Co., Denver, Colo., by using a small air brush. Brush marks are eliminated, blending is excellent and cleanup time is drastically reduced. As a result, repair work now pays its own way.

Originally designed to spray paint, the small air brush can also apply polyester and epoxy resins. Resins are thinned 10 to 15 per cent with acetone for application. *From a release of Binks Mfg., Chicago, Ill.*

Air brush does touchup job on boat.

INTRODUCING



Two-stage LS models for pressures to 1000 psi—sizes from 50 to 120 cfm.

Single-stage LA models for pressures to 125 psi—sizes from 71 to 240 cfm.

a new line of heavy-duty
GARDNER-DENVER COMPRESSORS

50 to 240 cfm piston displacement

Here are two new, compact Gardner-Denver air compressors designed for new efficiency and durability. Engineered interchangeability simplifies parts stocking. Built for years of continuous service, they require *only* routine maintenance.

Check these improved design features

NEW water-cooling design—gives more efficient use of power.

NEW positive pressure lubrication system to main bearings and connecting rods.

NEW bearings—adjustable, tapered roller bearings.

NEW aluminum pistons—lighter mass to start and stop . . . conserve power.

PLUS all the quality engineering you've been used to in Gardner-Denver compressors for nearly 100 years.

Get the complete story on these new compressors from your Gardner-Denver representative or write for Bulletin LA-1.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

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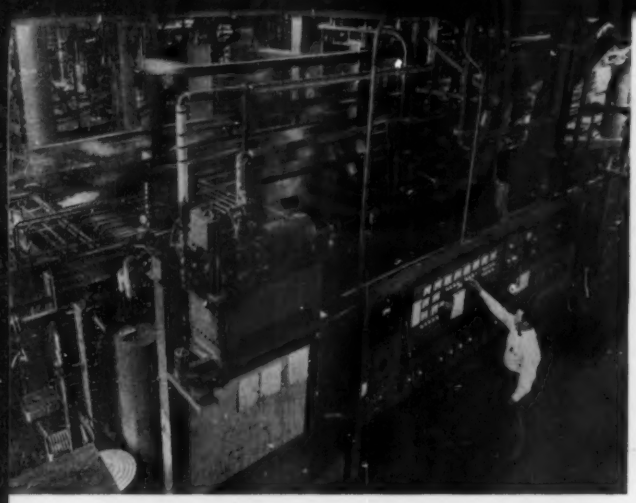
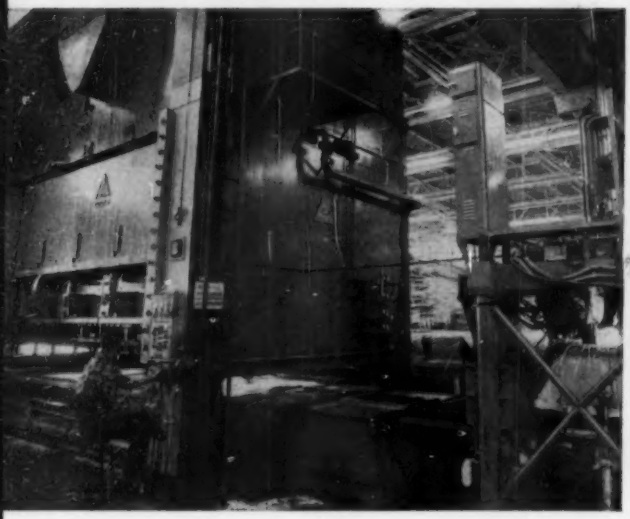
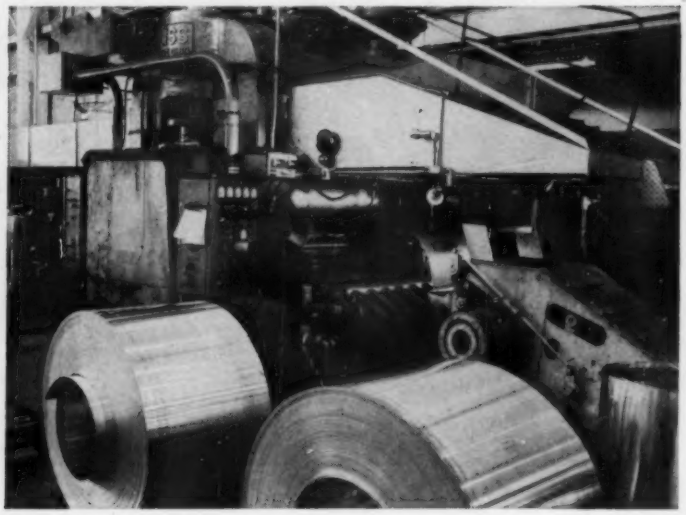


Extensive use of versatile Gulf Harmony oil in this electric range plant made possible a big reduction in the number of oils used. Shown in foreground is the hydraulic system where Gulf Harmony is used as hydraulic medium.

In steel mills, Gulfcrown Grease E.P. cuts maintenance costs because of its ability to withstand high temperatures and extreme pressure. Here Gulfcrown Grease E.P. is used in the lubrication of work rolls and table rolls.



Gulfcrown Grease, a Gulf E.P. Lubricant and Gulf Harmony oil keep downtime to a minimum on this 850-ton press. It turns out electric range bodies (flat) at the rate of 300 an hour.



Gear drives in this aluminum rolling mill are assured longer service life with Gulf E.P. Lubricants. In the mill's hydraulic system, Gulf Harmony oil's resistance to oxidation and rust preventive properties cut maintenance costs.

Gulf® multi-purpose greases and oils simplify lubrication,

GULF MAKES THINGS

At a large electric range plant, a Gulf Engineer set up a simplified lubrication program. As a result, the number of oils and greases was reduced from dozens down to only 6. Now, 3 oilers service the entire production line with its thousands of lubrication points.

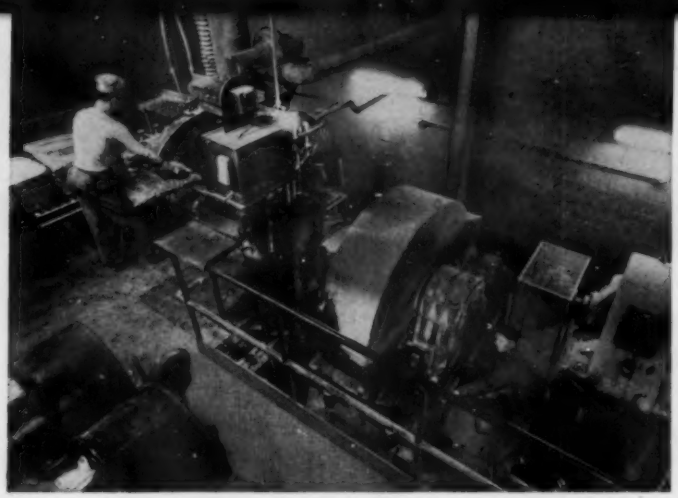
A rubber hose manufacturing plant has been following a Gulf-planned lubrication program for the past 10 years. Downtime has been reduced more than 30% on 300 basic processing machines and hundreds of auxiliary units, using only 6 Gulf greases and 3 Gulf oils.

And so it goes. In plant after plant, Gulf has set up simplified lubrication programs that have helped to solve complex lubrication problems and reduce costs with only a few basic oils and greases. The most versatile of these outstanding multi-purpose Gulf lubricants are:

Gulf Harmony® oil—ideal for hydraulic systems, air compressors, blowers, dryer-roll bearings, machine tools, electric motors, central circulating systems, and many other applications.

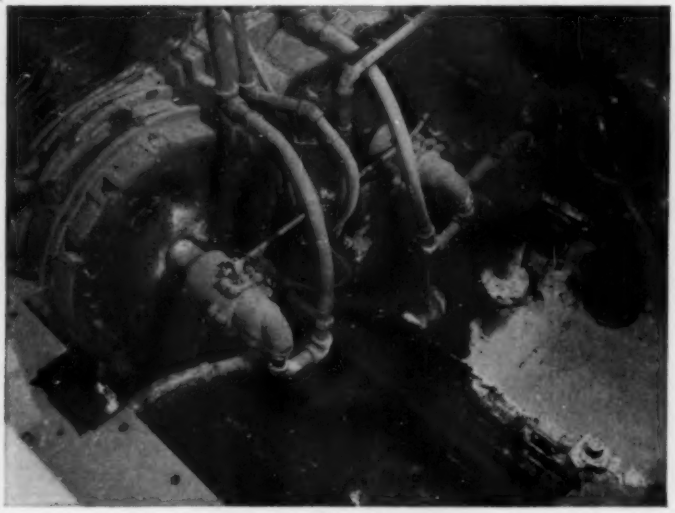
Gulfcrown® Grease—a general-purpose lubricant for virtually any application where extreme pressure characteristics are not required.

Gulfcrown® Grease E.P.—a superior lithium-base



Gulf lubricants helped cut downtime more than 30% in this rubber hose plant. With Gulfcrown Grease and Gulf Harmony oil, this spiral flow mixer hasn't had a mechanical breakdown in 10 years due to a lubrication problem.

Using Gulf Harmony oil and Gulfcrown Grease for critical bearing lubrication, this paper mill has logged 15,000 hours without downtime due to lubrication. At the same time, lube inventories were reduced from 39 types to 13.



Heavy bearing loads exist in these main bearings of a Banbury Mixer. Gulfcrown Grease E.P., a superior lithium-base grease, lubricates here with high mechanical stability which resists costly breakdowns.

Compressor units like these are protected against premature wear and excessive maintenance costs when lubricated with Gulf Harmony oil. Units are also assured longer life and are kept free from harmful sludge deposits.

cut costs . . .

RUN BETTER!

grease specially developed for use where heavy bearing and gear loads exist . . . where shock loads may occur . . . where machine element action is oscillating.

Gulf® E.P. Lubricants– a group of gear-drive lubricants with superior film strength. In many cases, one grade of lower viscosity can do the job of several mineral oils of higher viscosities.

Perhaps these versatile Gulf lubricants can help cut maintenance costs and simplify lubricant storage and handling in your plant. Just call a Gulf Sales Engineer at your nearest Gulf office. Or, write for product literature.

GULF OIL CORPORATION
Department DM, Gulf Building
Houston 1, Texas

GULF

For more facts circle 538 on Reply Card

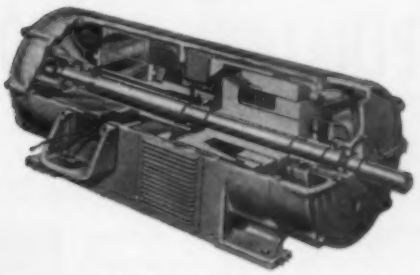
What do you need in an adjustable speed drive?

Better Regulation!

Compactness!

Less Maintenance!

7½-hp Ajusto-Spede Drive



Common motor-drive housing for units up to 7½ hp saves space — can be foot or flange mounted. Larger sizes up to 100 hp with individual motor and drive housings mounted integrally.

NEW design news from Louis Allis

...The Louis Allis AJUSTO-SPEDE® drive is more compact, precise, and trouble-free

Here's an adjustable speed drive that allows *truly precise* machine operation. Speed regulation is automatic and stepless — results in faster, more efficient production at lower cost, with less waste, and minimum wear on equipment.

These and other benefits are yours when you use the improved Louis Allis Ajusto-Spede drive. For example, it can be set before or during operation to deliver any desired speed within its range. Its *exclusive* tachometer feedback circuit monitors the output speed and *automatically corrects speed and holds it* regardless of load changes.

This improved drive requires minimum maintenance. Its stationary field has no brushes, commutators, or slip rings to cause trouble. The source of power is an equally trouble-free standard a-c squirrel cage motor. The cast-iron housing keeps out dirt, chips, and moisture — resists corrosion.

The compact Ajusto-Spede also saves space. Integrally-mounted motor and drive simplify handling — can be easily adapted for installation on new or existing machines. Controls can be mounted at the machine or any other convenient position.

The Louis Allis Ajusto-Spede drive is the practical solution to almost every application that requires dependable, easily controlled adjustable speed. It is the answer to precise operating speeds for machine tools, process machinery, test equipment, windups, conveyors, printing presses, and other equipment. Contact your Louis Allis District Office for information and application help. Or write for bulletins 2750 and 2800 — The Louis Allis Co., 434 East Stewart Street, Milwaukee 1, Wisconsin.

® Ajusto-Spede is a registered trademark of the Eaton Mfg. Co.

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

LOUIS ALLIS

For more facts circle 539 on Reply Card

ASD-537

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Two Layers of Sound Deadening Material Stops Transmission of Noise to Executive Offices

A SERIOUS office noise problem was solved in a new engineering building at Outboard Marine Corporation, Waukegan, Illinois, by the installation of a bi-level sound insulating ceiling.

Although the ceiling looks like the conventional perforated metal pan construction, there are two separated layers of sound absorbing pads with a sound transmission barrier installed above the metal pans. Called Acoustifelt, the sound deadening material manufactured by Forty-Eight Insulations, Inc., Aurora, Illinois, both absorbs and impedes sound waves. Passing through the pan perforations, the vibrating sound waves enter a compact pad of fine fibers where most of the sound is absorbed.

Certain frequencies, however, tend to penetrate nearly all economically feasible thicknesses of acoustical material unless there is an impenetrable surface directly above. This barrier is obtained by fastening a reflective sheet to the felt. The vibrating diaphragm reflects sound waves back into the pad where they are absorbed.

This fluctuating septum permits transmission of certain other frequencies but the addition of a second layer of sound absorbing material above the supporting channel solves this problem.

Acoustical pads, backed with foil, are inserted in perforated metal ceiling pans prior to installation. Foil serves as septum and diaphragm to kill noise passed through acoustical materials.

Second layer of sound deadening material is placed above the structural members supporting the ceiling. The two layers of acoustical material are separated by air space to reduce noise.

Upside Down Drilling Machine Puts Template in Front of Operator to Improve Precision Drilling

DEVELOPMENT of precise drilling techniques was necessary when Librascope Division, General Precision, Inc., Glendale, California, switched over to automated component assembly methods. Holes for mounting components by machine must be drilled with extreme precision to insure that the assembly machines are able to place each component lead correctly.

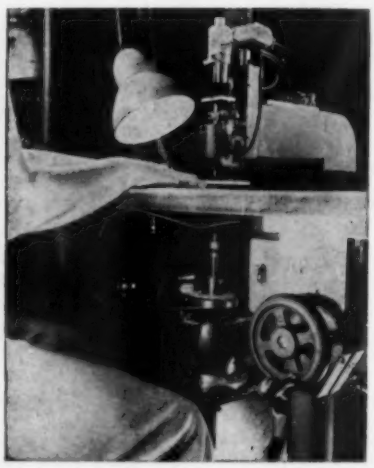
Designed by the division's own industrial engineering department, the semi-automatic drilling equipment was built to specifications by subcontractors. Since the new equipment was installed, reject rates have dropped drastically and output of drilled boards per operator has risen.

The semi-automatic drilling equipment consists of a table, a special positioning finger located above the table and an electrically controlled drill below the table. An operator gangs five circuit boards by placing them in a special positioning fixture.

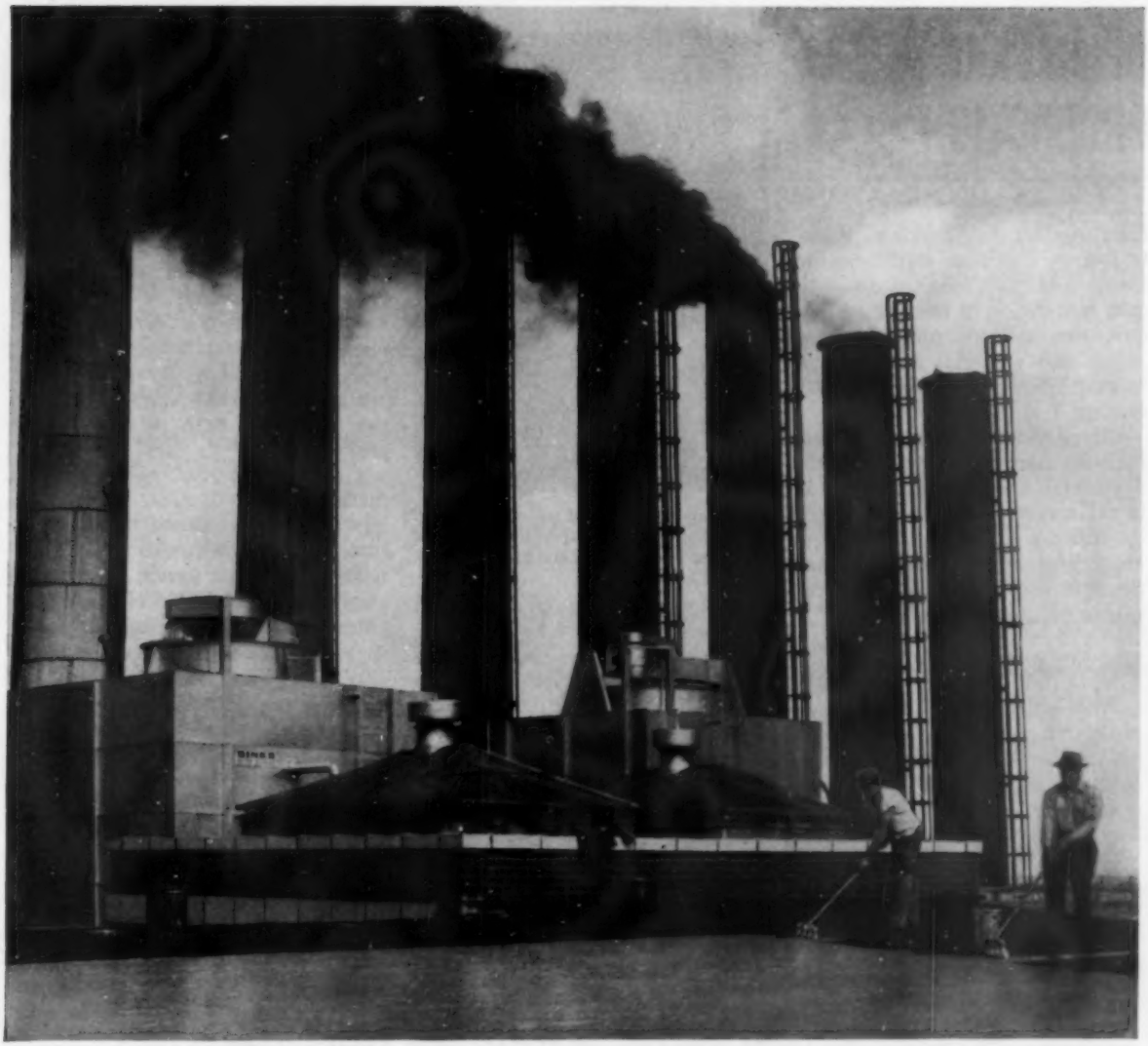
Placed, metal plate up, on the drill table, the operator guides the

(Continued on page 62)

As finger drops into each indentation of drilling pattern etched into fixture, workman operates the inverted drill.



Operated by toe switch, carbide drill rises at a controlled rate of speed to drill all five boards at the same time.



resists corrosion attack

Aluminum paint protects metals from corrosive fumes, smoke and gases

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

The thin, solid coat of aluminum that forms on surfaces painted with aluminum provides a lasting protective shield against rust and corrosion. Weathering exceptionally well, paint made with Reynolds Aluminum Pigment offers the major benefits of solid aluminum in liquid form. It's easy to apply, economical to use—and adds years of service life to the structures it covers. *Reynolds Metals Company, P.O. Box 2346-PL, Richmond 18, Va.*

REYNOLDS ALUMINUM

Watch Reynolds new TV show "Harrigan & Son", Fridays, starting October 7; also, "All Star Golf", Saturdays, resuming October 15—ABC-TV. And on Sunday, October 16, be sure to see the exclusive showing of America's new 1961 cars on The National Automobile Show, direct from Detroit over CBS-TV, 6 to 7 P.M. EDST.

For more facts circle 540 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 60)

fixture so that the positioning pointer follows a drilling pattern in the fixture. As the finger drops into each indentation of the drilling pattern, the operator touches a toe switch and a special carbide drill, located below the table, does the drilling.

Circuitry is arranged to prevent the drill from operating unless the positioning finger is located directly in the center of the indentation on the fixture's pattern. All five boards are drilled at the same time and the drill bottoms in the reinforced plastic backing of the fixture.

Modernizing Saves Switchboard

REPLACEMENT of old electrical protective equipment can be costly, difficult and time-consuming when loads expand beyond the ratings of existing equipment. This problem was created at the Kodak Park Works of Eastman Kodak Company, Rochester, N. Y. when installations of larger transformers increased fault currents beyond the interrupting capacity of branch circuit breakers.

New air circuit breakers, mounted on steel, fit into space formerly occupied by slate panels from the old breakers.

Original breakers were rigidly mounted large air circuit breakers which had provided 30 years of good service. Although still in serviceable condition, they were made obsolete by the combination of continuous demand for power and high possible fault currents. Substitution of new higher rated breakers of the same type was not practical because of the high cost of equipment no longer manufactured as standard.

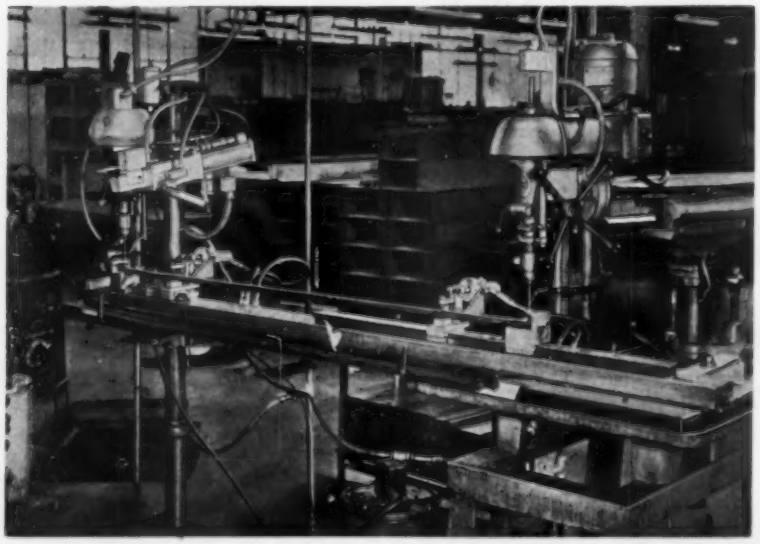
Kodak engineers selected Cordon molded case circuit breakers, made by I-T-E Circuit Breaker Company, Philadelphia, to replace the old breakers as they are designed for use on systems where the available fault current exceeds the interrupting rating of standard breakers. The new breakers combine regular thermal and magnetic overload protection against momentary and low-magnitude faults with current-limiting fuses for interruption of heavy fault currents. Short circuit stresses are reduced because the fault current is limited both in magnitude and duration.

Changeover to the new units was readily accomplished. The new breakers were mounted on a steel plate that interchanged perfectly with the old slate panels. Electrical installation consisted of making connections to the existing bus and the outgoing lines.

Magnets Improve Shear Accuracy

INSTALLATION of a series of magnetic rollers behind a sheet shear at Corey Steel Company, Chicago, Ill., has eliminated a cumbersome manual operation and added speed and accuracy to the production of flat steel sheets cut to specified dimensions. Prior to installation of

Slave Drill Press Automatically Follows Steps Performed by Master Drill Press; Cuts Labor in Half



Manually operated drill press, at right, controls operation of slave drill press at left. Limit switch at top of spindle operates clamps and slave drill press.

FOLLOWING EVERY MOVE of a master drill press, a slave drill press installed at Schieber Manufacturing Company, Detroit, Michigan, has converted a production operation requiring two operators into a semi-automatic operation needing only one man. This was accomplished by building a long fixture fitted across the two drill press tables.

One operator now simultaneously drills holes in both ends of tubular steel rods. Two pneumatically operated clamps, manufactured by Detroit Stamping Company hold the rod during the machining cycle.

When the operator advances his drill press spindle toward the work, a limit switch is operated to clamp the rod and actuate the slave drill press. Cycle is reversed when the operator withdraws his drill from the finished hole.

Steel sheet runs true against back gage since installation of magnetic rollers mounted on back of this sheet shear.

magnetic rollers, the sheet protruding from the shear would sag of its own weight on its way to the back gage and would have to be held up against the gage to assure accurate dimension and a true cut.

Since the permanent magnet roller channels, supplied by Eriez Manufacturing Company, Erie, Pa., were installed this manual operation has been eliminated. Now the sheet is grasped by the magnets and guided to the face of the back gage.

Air Conditions Entire Plant To Reduce Production Errors

AIR CONDITIONING equipment is being installed at Technical Measurement Corporation, North Haven, Conn., to air condition the entire production area in an effort to cut down on time spent correcting errors. The company discovered that hot weather increased the number of errors made by its 40 women production workers.

According to Robert M. Ghen, president of the company, "the amortized engineering time on a product is often more than the cost of labor and materials. We have to protect our competitive position not with patents, but with engineering know-how. To tie up engineers in hunting errors is a flagrant waste of company resources."

Decision to install the air conditioning equipment, furnished by Carrier Corporation, came last summer when quality control absorbed an increasing portion of the engineering staffs time. In cool weather the number of errors made by production workers remained fairly

THE POWERS REGULATOR COMPANY
Dept. 960
Skokie 23, Illinois

Send me a free copy of Powers Engineer's Manual For Steam-Water Service

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Specific requirement or problem:

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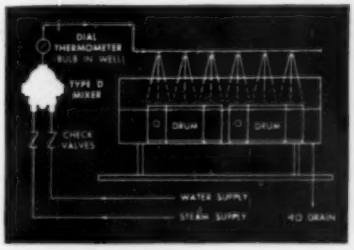
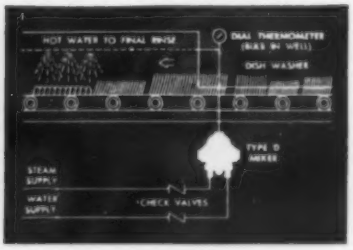
How To Maintain Uniform Process Hot Water Temperature





Schematics above show the function of Powers Type D Mixer in standard systems for maintaining uniform process hot water temperature where it is not practical to install or use a steam heated storage tank. These drawings are taken from the Powers *Engineer's Manual, Steam-Water Service* which is free to you for the asking. Each drawing is supplemented with detailed engineering information about the controls used. Everyone concerned with the installation and/or operation of steam-water service will find these diagrams a helpful guide in laying out a new system or updating an existing one. Other sections offer similar easy-to-follow diagrams and concise details on the following:

- Domestic Hot Water
- Hot Water Storage Heaters
- Instantaneous Heat Exchangers
- Heat Exchangers For Cooling
- Fuel Oil Heaters
- Pressure Reducing
- Jacket Water Cooling
- Two-Temperature Hot Water Systems

Fill in the above coupon to get your copy of this informative steam-water service manual.

POWERS CONTROL

THE POWERS REGULATOR COMPANY
Dept. 960, Skokie 23, Illinois
In Canada: The Powers Regulator Co. of Canada Ltd. Downsview, Ontario

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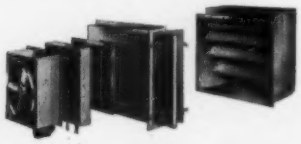
Your best investment in modern air-handling equipment! New Aerovent Air Make-Up Units provide clean, fresh air in winter or summer; help maintain uniform temperature levels throughout working areas. Used as filtered-air supply units or air preheaters, these versatile units permit heating and ventilating systems to operate at design efficiency; equalize negative pressures by replacing exhaust air.

Steam, hot water or gas-fired models in sizes 18" to 54" (larger units available on order) for capacities, pressure conditions and BTU ratings to suit your requirements. Compact, packaged design for roof or wall mounting. Other assemblies also supplied for exclusive use in air supply or air heater applications. Why not investigate the many advantages of these high-efficiency units, today?



STEAM OR HOT WATER

Furnished in 7 unit arrangements in sizes 24" to 54". Capacities from 5,000 to 35,000 CFM. Roof or wall types for all requirements.

GAS-FIRED

Supplied in 4 unit arrangements for roof or wall mounting. Sizes 36" to 54" for various capacities, BTU ratings and pressure conditions.

Write for new Bulletin 880

Air deliveries of all Aerovent equipment are tested and rated in accordance with established and accepted codes and each unit is guaranteed by the manufacturer to deliver its rated performance.

CERTIFIED PERFORMANCE

Aerovent FAN COMPANY, INC.

Ash and Bond Streets — Piqua, Ohio

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 60)

Air conditioning this entire production area will reduce hot weather errors and save time of engineers spent correcting mistakes in soldered connections.

low. But as temperatures rose, so did the complaints from the eight engineers who had to spend increasing amounts of time tracking down mistakes. An error in one of the 80,000 soldered joints in a digital computor manufactured by the company could cost two weeks of expensive engineering time to correct.

Shipping Desk Moves to Orders

A MOBILE packaging table is helping to reduce handling time in the shipping department of Multi-Clean Products, Inc., St. Paul, Minnesota. The unit consists of a steel table on casters equipped with all the tools and supplies necessary to pack and label cartons and cans for shipping. Such items as tape, labels, knife, stapler, glue, packing paper, packing list envelopes and address

Shipping table on casters is moved around the room from order to order.

For more facts circle 543 on Reply Card →

This shop cuts costs by using STANICUT *Oil 137 BCS*

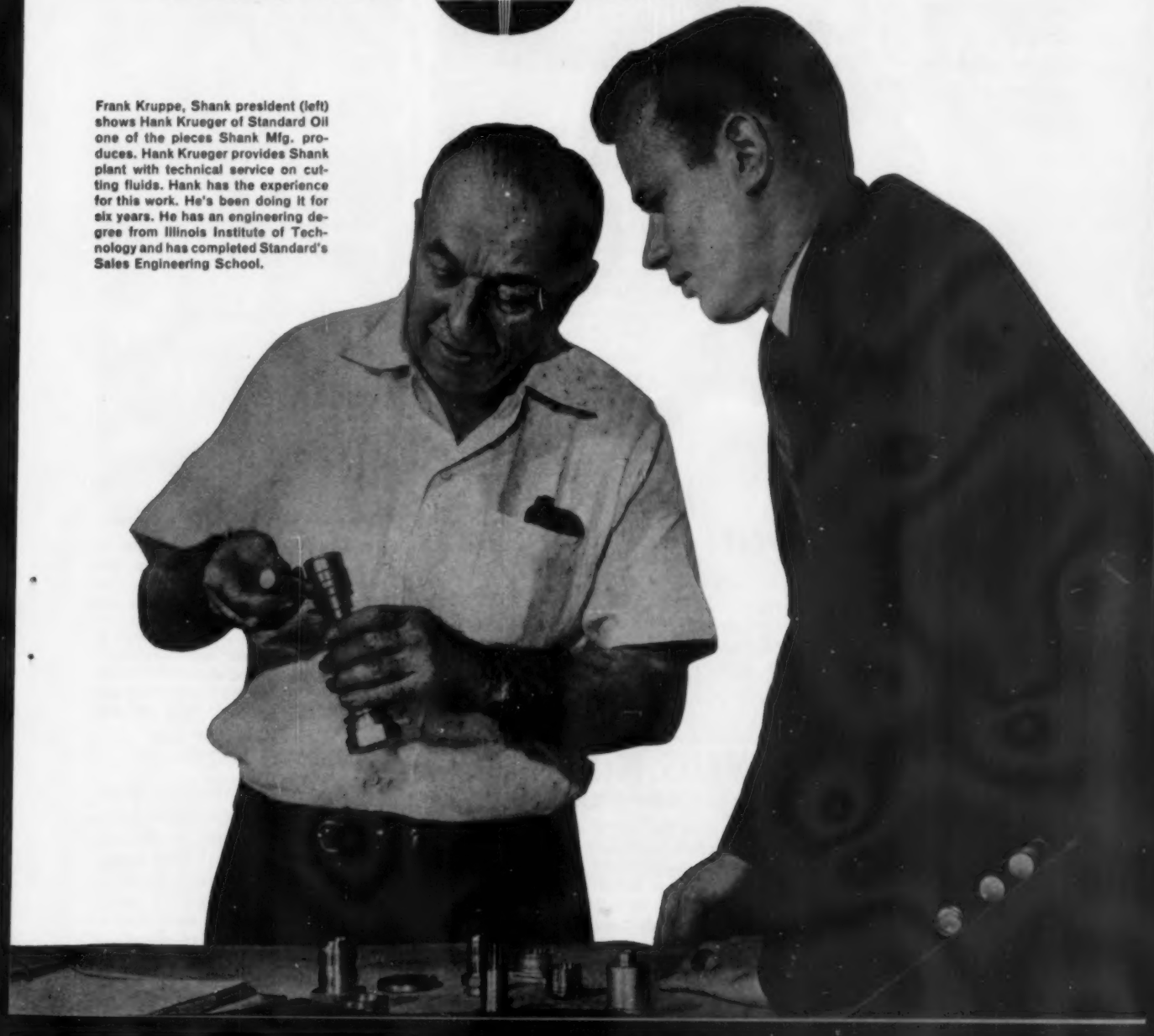
Machines seven metals, one plastic with this one cutting fluid

Shank Manufacturing Company, Chicago, cuts production costs three ways by using STANICUT Oil 137 BCS. (1) The 15 Warner & Swasey Lathes are never down for change of cutting fluid when the metal being worked is changed. There's no time lost with shutting down, cleaning up and changing oil. (2) There are no losses from the use of the wrong cutting fluid. (3) Floor space is used for productive machinery instead of being tied up as storage space for barrels of different cutting fluids.

Titanium, brass, alloy steel, aluminum and seven grades of Stainless plus Teflon plastic are all worked on the machines. Latest equipment, a reputation for good work, experienced operators and on-time delivery keep business coming to Shank. STANICUT Oil 137 BCS helps Shank hold down manufacturing costs.

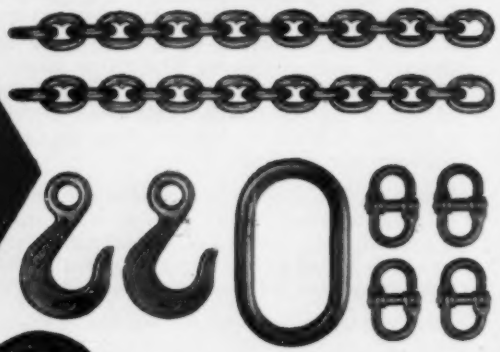
Does cutting costs with a cutting fluid interest you? Let one of Standard Oil's experienced lubrication specialists show you how STANICUT Oil 137 BCS can do it. Call the Standard Oil office nearest you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from STANDARD *and you get it!*



Frank Kruppe, Shank president (left) shows Hank Krueger of Standard Oil one of the pieces Shank Mfg. produces. Hank Krueger provides Shank plant with technical service on cutting fluids. Hank has the experience for this work. He's been doing it for six years. He has an engineering degree from Illinois Institute of Technology and has completed Standard's Sales Engineering School.

THIS FROM YOUR DISTRIBUTOR



TO THIS IN YOUR PLANT THE SAME DAY:

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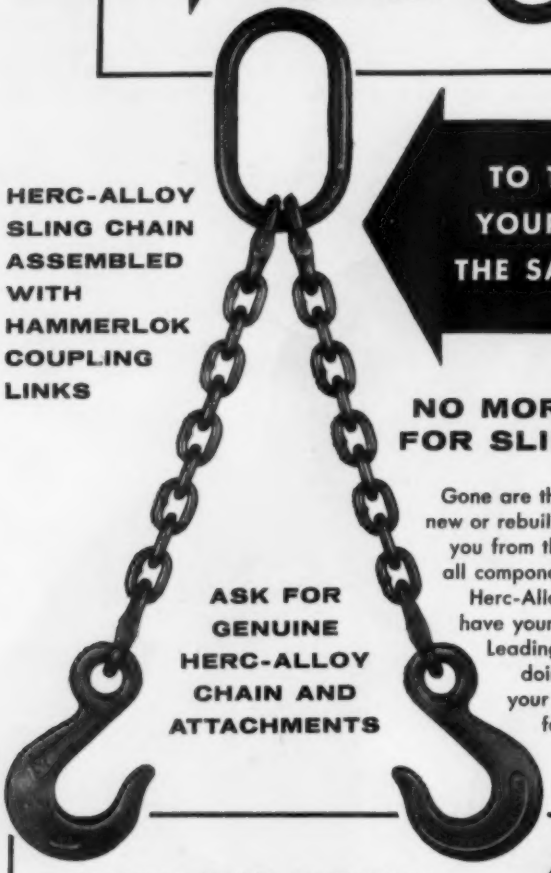
NO MORE WAITING FOR SLING CHAINS

Gone are the days of waiting for new or rebuilt sling chains to reach you from the factory. Now, with all components furnished by your Herc-Alloy distributor, you can have your slings the same day. Leading alloy chain users are doing it. Write us or call your CM Chain Distributor for catalog, prices and assembly chart.

ASK FOR GENUINE HERC-ALLOY CHAIN AND ATTACHMENTS



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With ***Hammerlok*** Coupling Links, anyone who can drive a nail can assemble or rebuild a sling chain in minutes. No peening! No welding! ***Hammerlok*** is rugged ...reusable...safe. Endorsed by leading alloy chain users.

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HERC-ALLOY® HAMMERLOK®

For more facts circle 544 on Reply Card

OPERATION—PRODUCTION

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printer are placed in special compartments on the table.

Once an order is brought into the shipping room, it does not have to be moved again until it is loaded on a truck. The shipping table on casters is moved around the shipping room from one order to another. Previously, each order had to be placed on a wheeled truck, moved to a fixed packaging location and then moved again to the shipping dock.

Designed and built by Multi-Clean's materials handling engineers, the mobile unit cuts handling time in half. In addition, time required to get an order processed is reduced.

Cam Storage Rack Saves Time

Eliminating trips to the toolroom or sorting out cams tossed into boxes, this home-built cabinet at Taylor Fibre Co., Norristown, Pa., is fitted with vertical separators of pegboard to make its complete cam assortment instantly available to machine operators right out on the fabricating shop floor. Cams are removed or replaced in seconds and full-depth of cabinet is fully utilized.

Air Lift Reduces Fatigue

A SMALL ELEVATING PLATFORM has enabled the Sprague Meter Company, Bridgeport, Conn., to mechanize a production-line lifting operation. Sprague manufactures a complete line of gas meters which

vary in size according to capacity. As the final production step before inspection and crating, the meters must be spray painted. In preparing the units for painting, a workman masks the dial face and wire-seals connections and bolt holes.

Previously, at this point, the workman had to lift the meter to an overhead conveyor line and secure it to a pair of hooks which carry it through the spray booth. It soon became apparent to Sprague production men that lifting the meters by hand quickly fatigued the workmen.

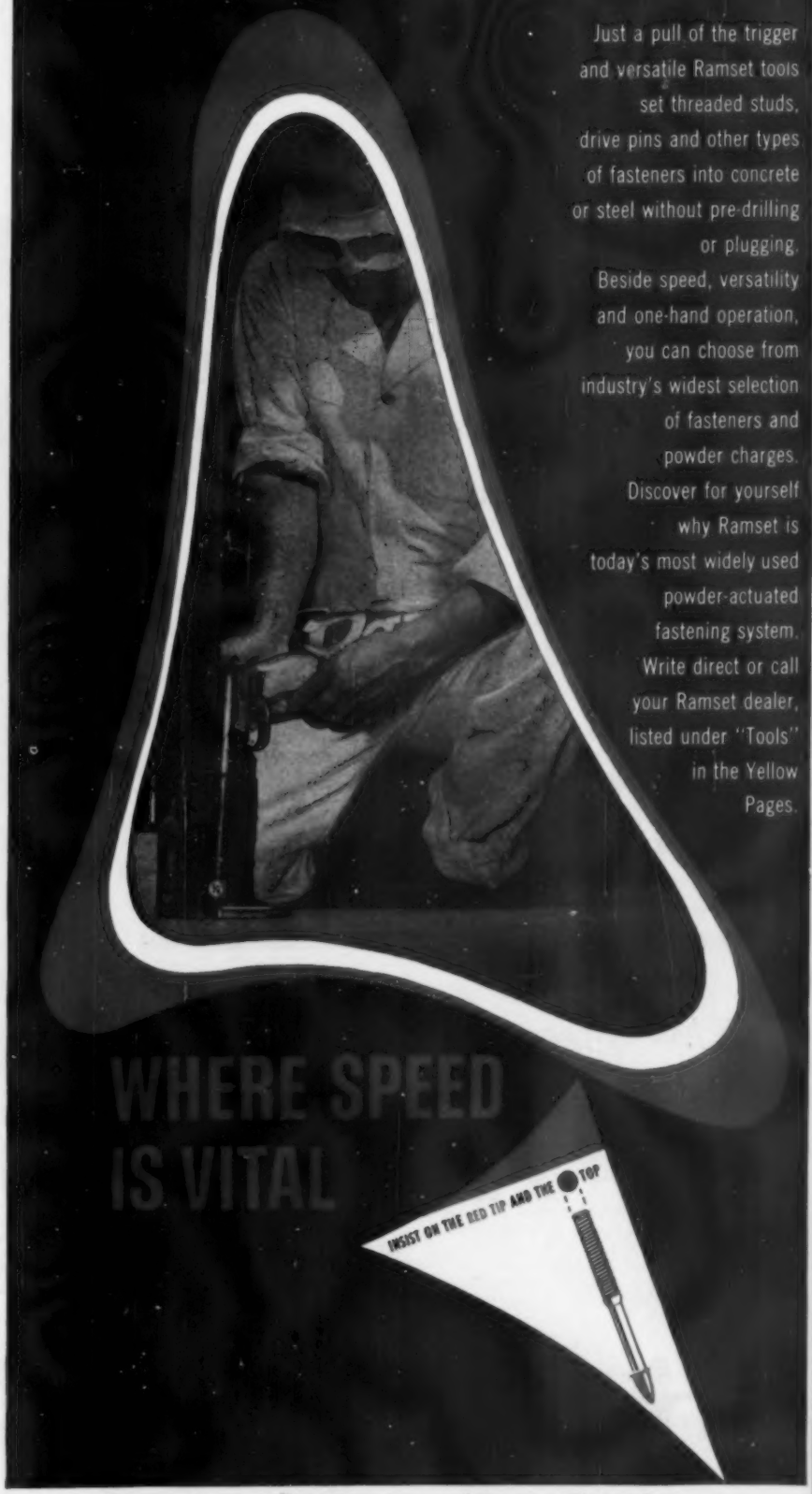
Small elevator, driven by air control system, lifts meter to the overhead conveyor line. Workman has both hands free to safely hook unit to the line. Elevator remains in raised position as long as the workman keeps his foot on the pedal underneath the table.

To solve this problem the small elevating platform was built into the surface of the work-bench and connected to an air cylinder mounted vertically underneath the bench. When the workman steps on a foot-operated three-way air valve, compressed air lifts the bench-top section carrying the meter to a set height. Both the cylinder and the three-way valve were furnished by A. Schrader's Son, Division of Scovill Manufacturing Company.

A flow control valve in the line between valve and cylinder regulates the rate of rise. With both hands free, the workman has no difficulty securing the meter to the conveyor line hooks. Once the meter is hooked, the workman removes his foot from the pedal and the platform retracts quickly, again becoming part of the bench top and ready to receive the next meter.

For more facts circle 545 on Reply Card➤

Cost-conscious maintenance men use **Ramset**



Just a pull of the trigger and versatile Ramset tools set threaded studs, drive pins and other types of fasteners into concrete or steel without pre-drilling or plugging. Beside speed, versatility and one-hand operation, you can choose from industry's widest selection of fasteners and powder charges. Discover for yourself why Ramset is today's most widely used powder-actuated fastening system. Write direct or call your Ramset dealer, listed under "Tools" in the Yellow Pages.

Ramset® Fastening System

OLIN MATHIESON CHEMICAL CORP. · WINCHESTER-WESTERN DIV. · 294-I WINCHESTER AVE. · NEW HAVEN 4, CONN.

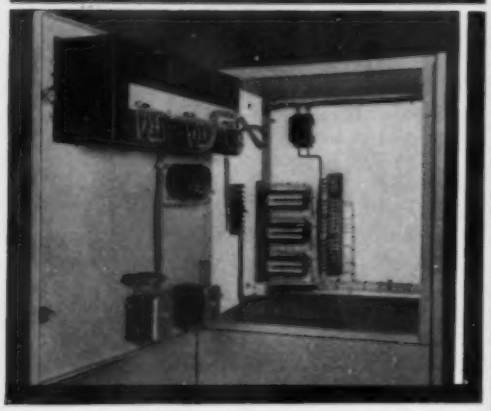
NEW COMPACTNESS

NEW SAFETY

NEW EASE OF ACCESS

NEW STORED ENERGY

This is the all-new I-T-E type HK metal-clad switchgear

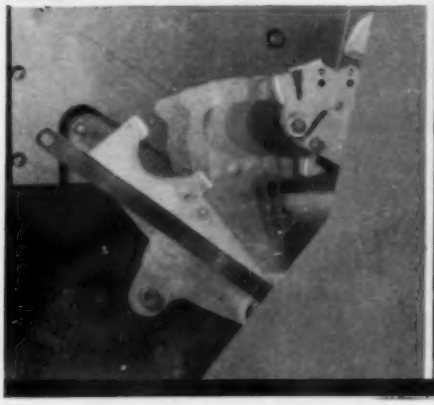


Roomy interior for easy access. Only I-T-E gives you a separate 30-in.-high instrument compartment, completely isolated from the high-voltage compartment. And it's closer to the floor, so you can reach into it easily. Put your elbows in and work in comfort. High visibility white interiors simplify installation and trouble shooting. Your control wiring can easily enter from the bottom or through the top sheet.

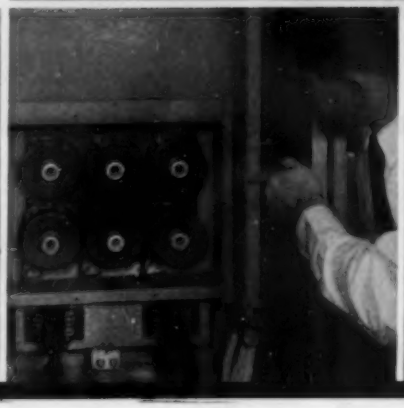
Free detailed bulletin—new strip film. Get the whole story about *all* the new advances in this I-T-E metal-clad switchgear. Learn about its easier operation, greater safety, and superior protection. Send for Bulletin 2801-2A. And ask also to see the new sound strip film. Can be shown to you singly or to your group. Contact your nearby I-T-E sales office or write I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

Fits where others won't. This new 4160 volt switchboard. See how low and shallow it is compared with old standards. It's only 80 in. high and 58 in. deep. So it saves both floor space and overhead space. Goes easily under low ceilings. Fits in narrower aisles. And its reduced height puts all instruments at easy-to-read eye level. Roomy cable compartments at the rear are accessible through hinged doors. All insulation in the switchboard and circuit breakers is flame-retardant and track-resistant.

Closed-door drawout. The door stays closed while the breaker is moved from connected . . . through test position . . . to disconnected and back. There's always solid steel at ground potential between the operator and the live parts of the gear. Even an inexperienced man is completely safe. Since doors stay closed, aisles need never be cluttered. And foreign matter can't get into breaker compartments.



Stored energy closing. This is not simply a new feature added to an old design. It is integrated into a completely new circuit breaker design. Gives you fast, uniform closing every time. Prolongs contact life. And you can close the circuit breakers even without control power. For greater economy, the spring charging motor draws only one-tenth the current of previous methods.

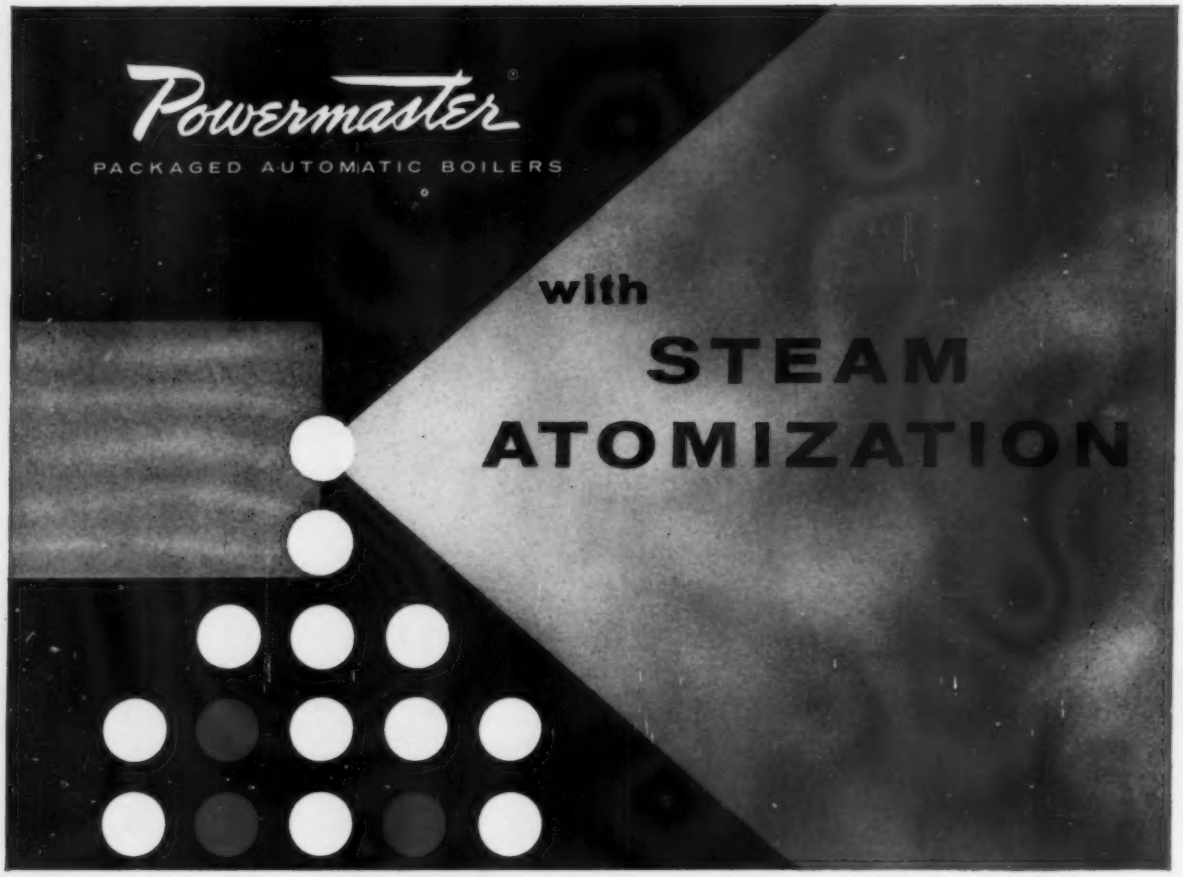


Easy-to-change current transformers. They're accessible from the front. You don't need to disturb your cable connections at all. Just remove the shutter barrier assembly over the primary studs, and there they are. As this view shows, you can locate current transformers on both load and line sides of the circuit breaker, providing more flexibility in relaying.

Compact 4160 volt circuit breaker. Low center of gravity permits easy, safe, one-man maintenance. High-strength, flame-retardant track-resistant moldings eliminate need for structural metal above the base frame. Provides insulation strength where needed most. Arc chutes tilt for easy inspection. Lift off without tools. Modern materials and new design result in substantial reduction in circuit breaker size.

I-T-E CIRCUIT BREAKER COMPANY

For more facts circle 546 on Reply Card



This advanced packaged boiler drastically cuts process steam costs

Lower fuel costs plus . . .

- Fast steaming.
- Instant response to load changes.
- Clean, dry steam.
- Perfect fuel-air ratio—automatically.
- Clean, quiet operation.
- Automatic safety equipment.
- Easy operation.
- Easy installation.

Does concern about operating difficulties and costly shut-downs keep you from using low-cost No. 6 fuel oil? Here, in one great new package is the answer to your problems.

Powermaster, the outstanding packaged boiler, continues to lead the industry with the introduction of steam atomization—a feature previously limited to expensive field-erected plants. *Powermaster* with steam atomization will fire the heaviest grades of fuel oil at peak efficiency with reliability and reduced maintenance never before possible in a packaged automatic boiler. There are no moving parts to wear, no complex mechanism requiring frequent adjustment in the *Powermaster* steam atomizing burner.

Now you can burn No. 6 oil with confidence. Savings accruing from the lower cost No. 6 oil compared to the more expensive lighter grades can cut process steam costs in many plants by $1,000 a month and up. And a new *Powermaster* can pay for itself in fuel savings alone in less than two years!

Write for Bulletin 1252 on Steam Atomization.

ORR & SEMBOWER, INC.
840 Morgantown Road
Reading, Pa. • Since 1885

Powermaster®
PACKAGED AUTOMATIC BOILERS

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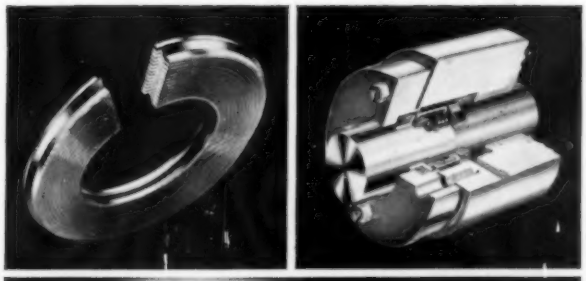
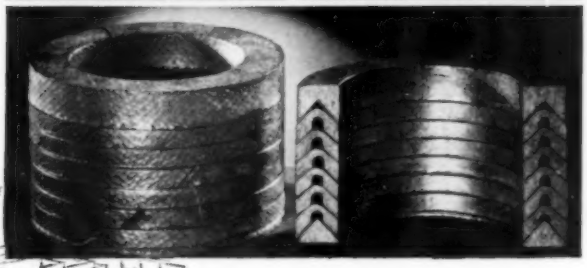
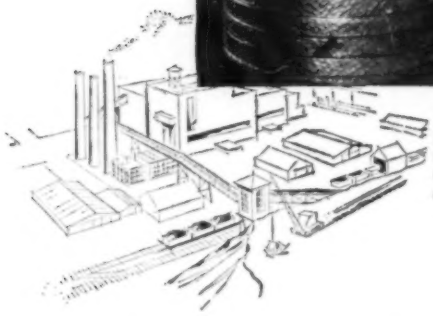
ENGINEERED PRODUCTS
for Plant Maintenance







Garlock GUARDIAN Gaskets (upper left), PK Mechanical Seals (upper right), and CHEVRON Packings (bottom) are all designed to prevent leakage and lower maintenance costs on your plant equipment.

Many utilities and industrial companies standardize on Garlock products for low-maintenance, leak-free sealing throughout the plant.

On flanged joints, valve bonnets, boiler tube caps, manholes and handholes, Garlock GUARDIAN * Gaskets are expertly engineered to meet specific conditions of joint stress, corrosion, thermal and physical shock. This is accomplished by alternating spiral wound strips of required V-shaped metal and plies of proper filler material. *Gasket density* controlled by the proper relationship of filler and preformed metal assures a safe, resilient seal which adjusts itself to changes in operation conditions. Used at temperatures to 1050°F., pressures to 2500 psi, against steam, oils, gases, liquids—practically any size or shape *Large regional warehouse stocks* are maintained for your convenience and faster delivery, at *Camden, Cleveland, Houston and San Francisco.* Catalog AD-104.

For rotating shafts, Garlock PK Mechanical Seals are easy to install and maintain. They are completely self-contained . . . no parts to put together. Rotating portion simply slides onto shaft; stationary portion positions quickly. No parts of the seal move on the shaft or sleeve, eliminating wear on the shaft. Available in shaft sizes from $\frac{3}{8}$" to 3" for speeds up to 2000 f.p.m. and higher, 212°F temperatures, 150 psi pressures. Catalog AD-150.

For rams, plungers, and reciprocating rods, Garlock CHEVRON* Packings assure positive, low friction sealing. With an exclusive hinge-like construction, CHEVRON packing rings tighten to prevent leakage as pressures increase. When pressures decline, the rings ease off to permit free operation of the rod, ram, or piston without leakage. Also CHEVRON packing rings are designed to work efficiently in shallower stuffing boxes. Use against water, steam, oil, gases and chemicals to 600°F. Catalog AD-115.

GARLOCK

For more information, call your local Garlock representative at the nearest of Garlock's 26 sales offices and warehouses throughout the U.S. and Canada. Or, write for the catalog indicated. Garlock Inc., Palmyra, New York.

Canadian Div.: Garlock of Canada Ltd.

Plastics Div.: United States Gasket Company

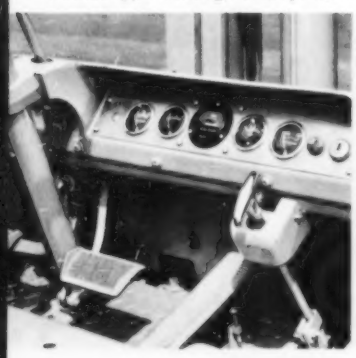
Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products

*Registered Trademark

For more facts circle 548 on Reply Card

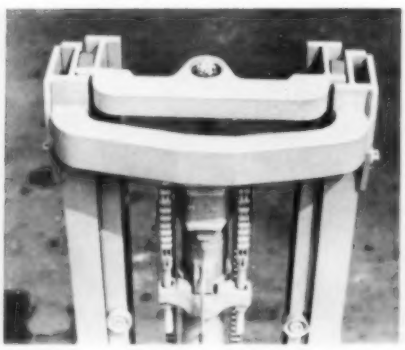
For more facts circle 549 on Reply Card——→

Fast, safe operation • centrally located controls • protected instrument panel • separated ignition key and starter switch • reinforced steering column bracket • automotive type inching, brake pedals.



Low seating position on G54 speeds trailer loading and increases safety. Seating height of 37" and overall height of 71" affords the driver plenty of headroom for safer operation.

Double I-beam on mast affords greater strength and stability, and less deflection. Exclusive side thrust rollers for mast and carriage assure frictionless lifting action at all times.



YALE OFFERS: FIRST COMPACT GAS LIFT TRUCKS

• Solid or pneumatic-tired • 3000, 4000, 5000 lb. capacity • Gasoline or LP-Gas powered • 52 HP engine in solid-tired model, 72 HP engine in pneumatic-tired model • New, improved automatic torque transmission.

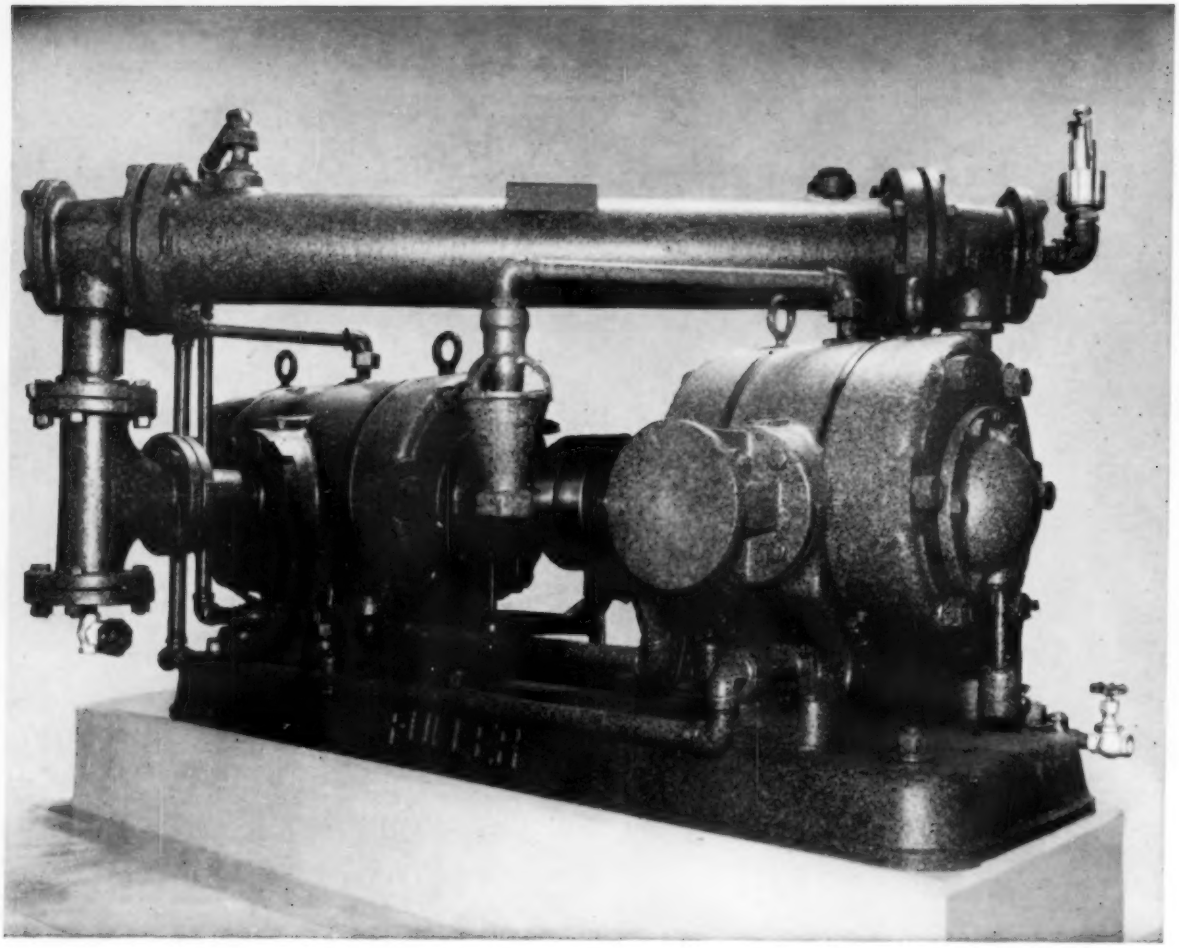
You get compactness and speed for faster, safer operation cycle from the Yale G54 series gas trucks. Lifting is a job the Yale Compact does fast . . . from 75 to 80 FPM. Its controlled lowering speed ranges from 55 to 80 FPM. You have full lifting speed at all times, plus increased pump life, assured by the patented self-charged hydraulic tank. You easily adjust the exclusive mechanical inching control to your individual operational requirements. What's more, Yale Compact offers you greater safety, with self-energizing, self-adjusting brakes and wheels. Operation is easier and more efficient. You operate all hydraulic attachments of the Yale Compact with only one exclusive, multi-function control handle.

Safe ride and shock reduction, better stability, and a self-righting effect come from Yale's new steering axle design. Steering axle mounts on two 2″ diameter articulating pins.

Put this truck to work for you immediately, ask about Yale's own leasing plan. For more information, contact your Yale Representative, or write to: The Yale & Towne Manufacturing Company, Materials Handling Division, Philadelphia 15, Pa., Dept. G-006.

Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., Forrest City, Ark. Products: Gasoline, Electric, Diesel, and LP-Gas Industrial Lift Trucks. Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air, and Electric Hoists.

YALE®
INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS · HOISTS
YALE & TOWNE



Fuller Compressors With Overhead Intercoolers Offer A New Dimension In Compactness

Fuller Rotary Two-Stage Compressors equipped with Overhead Intercoolers fill the bill where space may be a problem. These compressors produce from 30 to 3300 cfm, pressures to 125 lb. gage and can be readily installed.

These compact Rotary Compressors are vibration-free, thereby eliminating the need for involved and expensive foundations or structural modifications.

The Fuller rotary principle permits complete freedom of reciprocating parts—valves, crankshafts, pistons—cutting the need for frequent servicing and parts replacement. Minor maintenance is all the care indicated for years of serviceability.

For full details on the maintenance-free economy and high performance of Fuller rotaries, write today for comprehensive, illustrated Bulletin C-5A. 2626 C359

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

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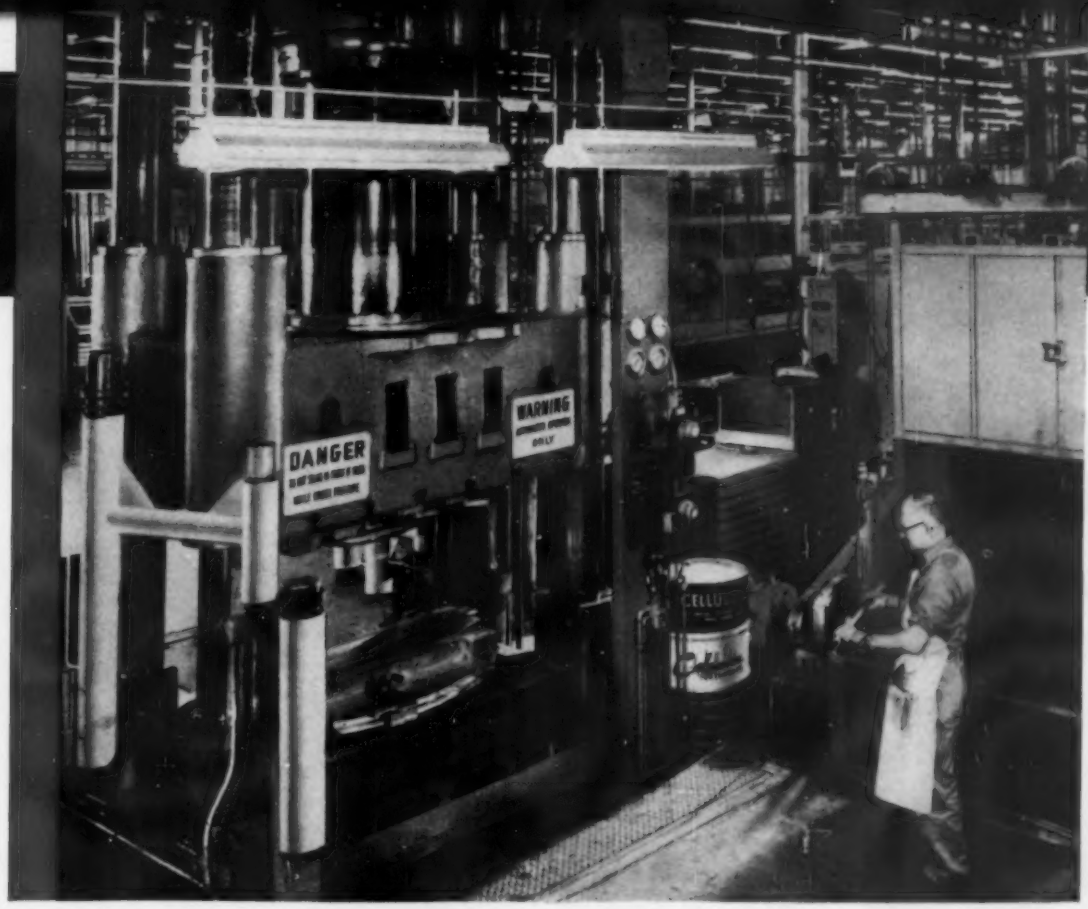

Cellulubes promote safety at North American

where hydraulic presses handle titanium at 1000°F.

Hydraulic line breaks could be a serious fire hazard in this hot press-forming operation.

For five years North American Aviation has assured maximum safety by using Cellulube 220 fire-resistant synthetic fluid in their specially developed hydraulic press for form-die quenching. During the process, fully expanded parts at 1000°F. are transferred from a nearby electric furnace to the press to hot-form aircraft parts made of high-strength alloys.

Cellulubes, the *safe* hydraulic fluids, are available in six controlled viscosities: 90, 150, 220, 300, 550 and 1000 SUS at 100°F. You can select the viscosity best suited to your operations. Cellulubes may well make an important contribution to the safety of your plant and personnel. Write to us for more information about Cellulubes, and please let us know what application you have in mind.

Celanese® Cellulube®

CELANESE CHEMICAL COMPANY
a Division of Celanese Corporation of America
Dept. 585-S, 180 Madison Ave., New York 16, N.Y.

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16.

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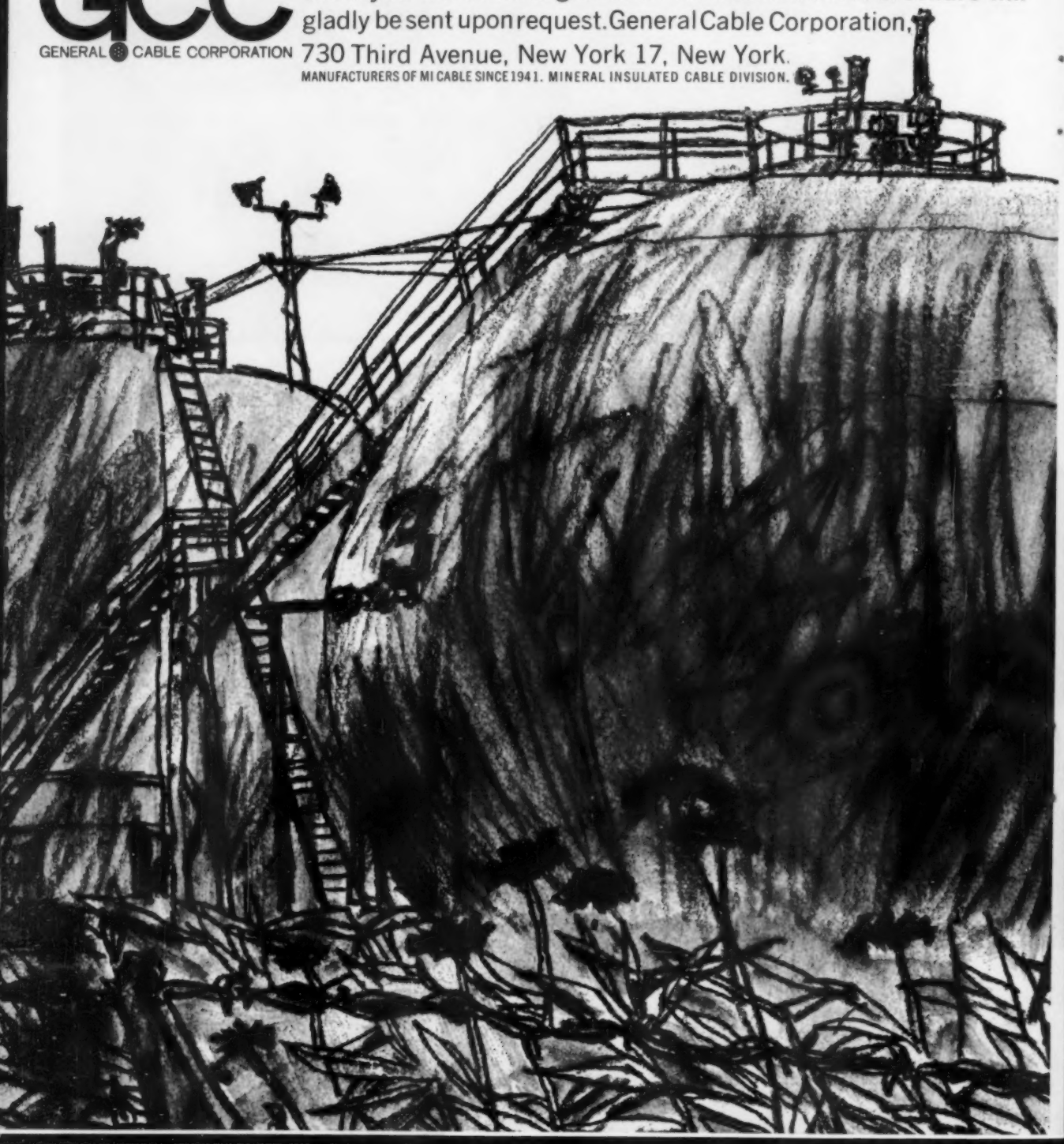
Celanese
CHEMICALS

ONLY MI OFFERS SO MUCH FOR SO MANY INDUSTRIAL WIRING APPLICATIONS

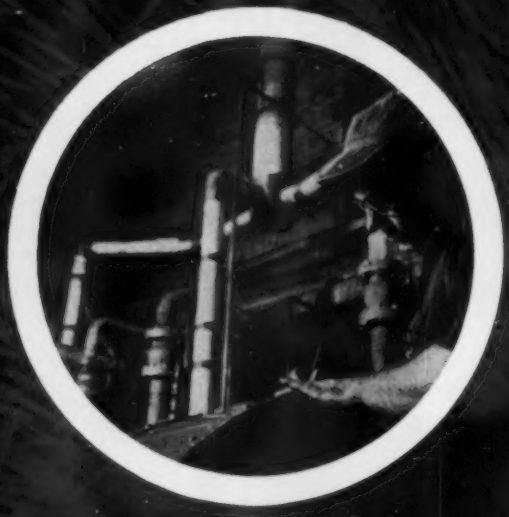
Due to its unique design, a Mineral Insulated wiring system has built-in safety and performance features not found in any other type of wiring device. These qualities enable MI cable to give maximum service and safety in locations where gases, dusts, water or heat cause ordinary wiring systems to break down. If hazardous areas or "trouble spots" are a problem in your plant, we'd appreciate the opportunity to show you the advantages of an MI installation. A brochure will gladly be sent upon request. General Cable Corporation, 730 Third Avenue, New York 17, New York.

GCC
GENERAL CABLE CORPORATION

MANUFACTURERS OF MI CABLE SINCE 1941. MINERAL INSULATED CABLE DIVISION.



PRIVATE PROPERTY
KEEP OFF
DANGER
PUBLIC SERVICE



Amweld rings up $14,621

On 8 ring-sizing machines Amweld was experiencing hydraulic difficulties similar to those in the butt welding units. Oil deposits, sticking valves, pump failures, etc. were common problems. 1040 maintenance man-hours a year were required to keep the equipment operating. But again the introduction of a Mobil hydraulic oil and preventive maintenance procedures slashed this labor cost, saved Amweld $2,005 the first year.

On three of Amweld's expander units, brass wear plates on the expanding mandrel were undergoing serious wear. Frequent replacement of these plates, with attendant labor costs, meant a $3,936 expenditure for Amweld in one year alone. Studying the problem, Mobil Engineers recommended an extreme pressure grease. In the year since this Mobil product was introduced, not a single replacement has been made.

savings with Mobil!

A leading producer of welded rings, American Welding & Manufacturing Co. cuts maintenance costs with Mobil Lubricants and engineering service.

Specializing in the production of welded rings, bands and assemblies, American Welding has developed methods and techniques for precision-welding alloy steels and non-ferrous materials in both light gauges and heavy sections. Parts are supplied "as-welded," or machined and finished, to prime contractors, and include components for jet engines and missiles.

Critical tolerance requirements demand rigid maintenance procedures at Amweld. And Mobil products and engineering service have made significant contributions in terms of minimized machine downtime and consistent savings in lubricant and parts costs. Working in close cooperation with Amweld technical personnel, Mobil has made recommendations that have saved this producer $14,621.

Mobil's extensive background in lubrication may help you achieve similar savings in your plant. Your Mobil Representative is the man who can tell you.

Mobil

CORRECT LUBRICATION

MOBIL OIL COMPANY, 150 E. 42nd St., New York 17, N.Y.

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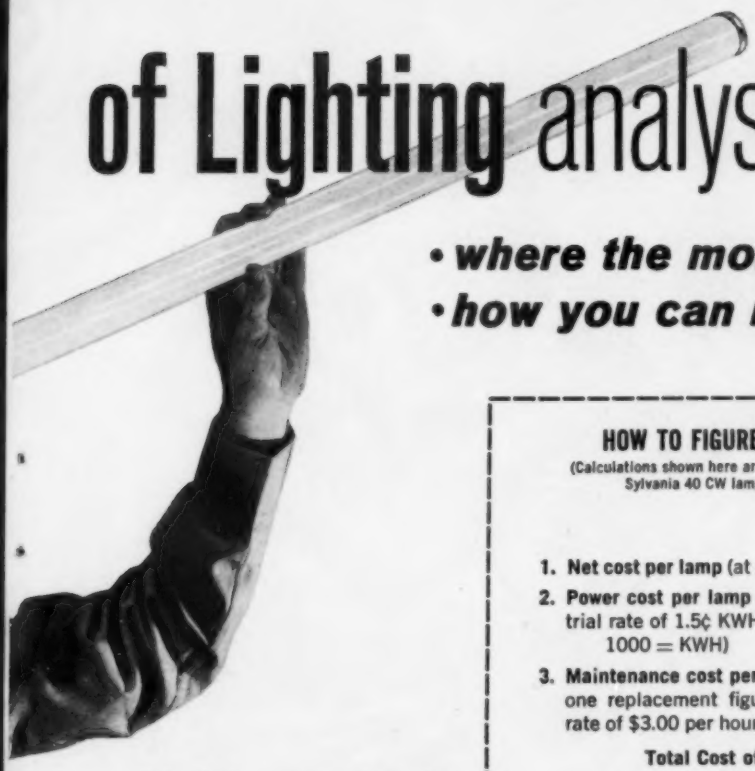
If you just figure
the cost of lamps
you only know about
1/10th of the story!
Only a Total Cost
What about
cost of
power?
What about
his time?
What about
cost of lamps?
GLASS
SYLVANIA

# of Lighting analysis can show



- ***where the money really goes***
- ***how you can really cut expenses***

HOW TO FIGURE YOUR TOTAL COST OF LIGHTING (TCL)

(Calculations shown here are based on the average 7500-hour operating life of a standard Sylvania 40 CW lamp which requires 46 watts of power including ballast.)

	National average per lamp	Put your costs here
1. **Net cost per lamp** (at average discount of 35%)	$ .81	
2. **Power cost per lamp** based on average industrial rate of 1.5¢ KWH (watts × 7500 hours ÷ 1000 = KWH)	5.18	
3. **Maintenance cost per lamp** (one cleaning plus one replacement figured at average industry rate of $3.00 per hour)	2.00	
Total Cost of Lighting (TCL) per lamp	7.99	
TCL for 100-lamp installation	$799.00	
(Note: If you use 100 Sylvania lamps, figure the 8% extra lighting value of 8 lamps over 100 ordinary lamps.*)	× .08	
Saving through extra Sylvania lighting value*	$ 63.92	

*These are the extra dollars you would have to spend per 100 ordinary lamps to get the equal lumen hours of light you get from Sylvania.

Sylvania is so sure savings will result from figuring this way, we'll even send our representative to show you how (or you can do it here—now!)

With cost of lamps amounting to only about 10% of your *T*otal *C*ost of *L*ighting (TCL), why should Sylvania be so interested in this new over-all way of figuring? Two good reasons:

First, because TCL best demonstrates the over-all superiority of Sylvania fluorescents.

Second, because we believe that just in figuring TCL you'll discover a number of new opportunities for shaving costs. And that's one of the things we like to help you do.

What *is* your TCL? Cost of lamps *plus* power *plus* maintenance. Add cost of fixtures, too, if you're remodeling.

WITH TCL ANALYZER, a Sylvania representative can figure in minutes how the special conditions in your plant affect Total Cost of Lighting.

Our representative can help figure special conditions in your plant. With his Analyzer Kit, he can do it in minutes, give you a complete lighting analysis *free*.

He can also show you how and why, for every penny you spend for lamps, power and maintenance, you get more value with Sylvania.

And he'll show how Sylvania backs its claims to lowest TCL with an *exclusive* Light Insurance Policy. *Guarantees* Sylvania fluorescents will perform better *in your own opinion* than the brand you are now using—or your money back!

Call your Sylvania representative. Or write us: Sylvania Lighting Products, a Division of Sylvania Electric Products Inc., Dept 59, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada), Ltd., Box 2190, Station "O," Montreal 9.

EXCLUSIVE SYLVANIA LIGHT INSURANCE POLICY is your guarantee of lowest TCL—or your money back!

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

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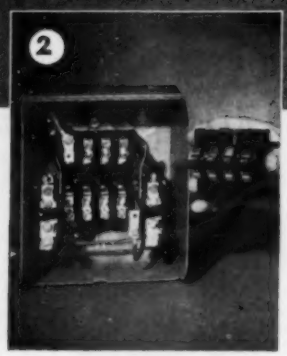
You get **MEASURABLE ADVANTAGES** WITH GENERAL ELECTRIC CONTROL



HOW GENERAL ELECTRIC STARTER BENEFITS ADD TO SAVINGS

1. **25-SECOND COIL CHANGE**—Without tools, without removing wiring, you can change a coil on a General Electric magnetic starter to meet different application requirements.
2. **10-SECOND CONTACT INSPECTION**—Just lift off coil spring clamps, remove entire magnet and movable contact assembly. No tools needed, no wiring to remove.
3. **ADJUSTABLE OVERLOAD SETTING**—A handy knob adjusts the nominal heater rating ±15% to meet special applications. No need to change or reposition heater.
4. **VARIETY OF MODIFICATION KITS**—Seven G-E modification kits—including push button, selector switch, and indicating light—meet wide variety of application needs with minimum stock.
5. **PLUG-IN HEATER FOR CR101 MANUAL STARTER** is offered only by General Electric. Plugs in from front in seconds; can't be installed the wrong way.

With all General Electric Controls:

LITTLE CONVENIENCES ADD UP TO BIG COST SAVINGS

This foot switch doesn't skid unintentionally. A small convenience? Perhaps. But when you consider that the operator doesn't have to continually reposition the switch, you have a measurable advantage which could add up to a big cost savings for you. All General Electric General Purpose Control devices offer measurable conveniences. Other devices, like size 0, 1, and 2 starters, offer coil change in 25 seconds . . . without tools . . . without changing wiring. Time to inspect contacts: 10 seconds! And a twist of the wrist adjusts overload settings. Plus a wide variety of easily installed G-E starter modification kits cuts stocks to a minimum. Just pick your G-E control device and there's a convenience you can measure.

Generally, conveniences don't become important —or measured—until they are missed. Why wait. Call your General Electric representative now for details or write for Bulletins GEA-7086 on Foot Switches, GEA-7020 on Magnetic Starters, GEA-6358 on Manual Starters. Let G-E control conveniences and proved quality performance add up big cost savings for you. 813-26

Progress Is Our Most Important Product

GENERAL ELECTRIC

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Use this IMPERIAL select from industry's

No matter what your tube fitting requirements — for low- or high-pressure circuitry — **see your Imperial Distributor.** He carries industry's most complete stocks in a full range of sizes and types, ready to serve your needs. And he also has the tubing tools that assure easy-to-make, leakproof tubing installations.

Ask for Catalog No. 200.

	MINOR SURGE Use 4:1 safety factor S-1	SURGES up to 50% Use 6:1 safety factor S-2	SURGES up to 100% Use 8:1 safety factor S-3	SURGES of 100% to 150% Use 10:1 safety factor S-4
HI-SEAL Brass	●	●		
Steel	●	●	●	●
Stainless steel	●	●	●	●
Aluminum	●	●	●	●
BRAZE-SEAL Steel	●	●	●	●
Stainless steel	●	●	●	●
HI-DUTY Brass	●	●		
3. **FLEX** Brass	●	●		
COMPRESSION Brass	●			
4. **POLY-FLO** Brass	●			
NYLO-SEAL Nylon	●	●		
INVERTED FLARE Brass	●	○		
SAE 45° Brass	●	●	○	
JIC 37° Brass	●	●	○	
Steel	●	●	●	
Stainless steel	●	●	●	
8. **PRESSURE HOSE & REUSABLE COUPLINGS**	●	●	●	●

FOOTNOTES:
1. Tubing should be double-flared.
2. End of tubing must be outside tinned to fill any seam.
3. End of tube should be belled when FLEX FITTINGS are used in sizes over 1/2" or when used for Medium Pressures on sizes over 5/16".
4. Recommendations based on use with Poly-Flo Polyethylene Tubing.

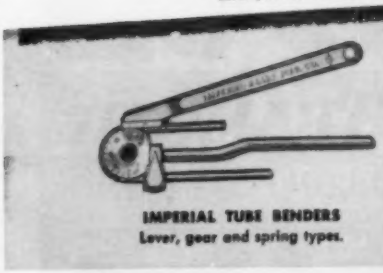
IMPERIAL

THE IMPERIAL BRASS MANUFACTURING COMPANY,
6300 West Howard Street, Chicago 48, Illinois
Dept. PE-90

Good tube circuitry demands not only the best fittings—*but also the best tools:*

tube fitting chart...
widest line

PRESSURE CONDITIONS *
LOW 0-200 PSI
MEDIUM 200-500 PSI
MEDIUM HIGH 500-1200 PSI
HIGH 1200-3000 PSI
EXTRA-HIGH 3000-9000 PSI
VIBRATION CONDITIONS
Negligible Vibration
Minor vibration
Major vibration Minor tube movement
Major tube movement
TUBING TO BE USED **
COPPER
SEAMLESS STEEL
BRAZED STEEL
ALUMINUM
STAINLESS STEEL
POLYETHYLENE
NYLON
HOSE
HOW TO USE THIS CHART
Indicates ESPECIALLY RECOMMENDED for this purpose.
Indicates CAN BE USED for this purpose.
Numerals in Solid Circle or Ring—Use is subject to conditions as shown in footnotes.
Whenever possible select a fitting with a solid circle under each of the conditions applying to the job. If no one fitting has a solid circle in each classification, then select a fitting with solid circle or a ring in each classification.
*Allowable working pressure will vary with the diameter of the tubing and the tubing material. For specific information write to factory.
**It is assumed tubing selected will be of material, temper and wall thickness adapted for pressure and application involved.
5. Recommended for working pressures to 125 psi—1/4" and 5/16" O.D.; 100 psi—3/8" O.D. Temperatures from −90° F. to + 175° F.
6. Recommended for working pressures to 250 psi. at temperatures up to 120° F.
7. When used with flexible plastic tubing.
8. See catalog for type of hose and couplings which meet your specific conditions.
S-1 Recommended for S-1 Service Conditions.
S-2 Recommended for S-2 Service Conditions.
S-3 Recommended for S-3 Service Conditions.
S-4 Recommended for S-4 Service Conditions.



IMPERIAL TUBE BENDERS
Lever, gear and spring types.

IMPERIAL FLARING TOOLS
All types for making 45° and 37° flares — single and double.

IMPERIAL TUBE CUTTERS
For tubing ⅛ to 2¼ O.D.

IMPERIAL VALVES
Needle, plug, toggle and diaphragm types.

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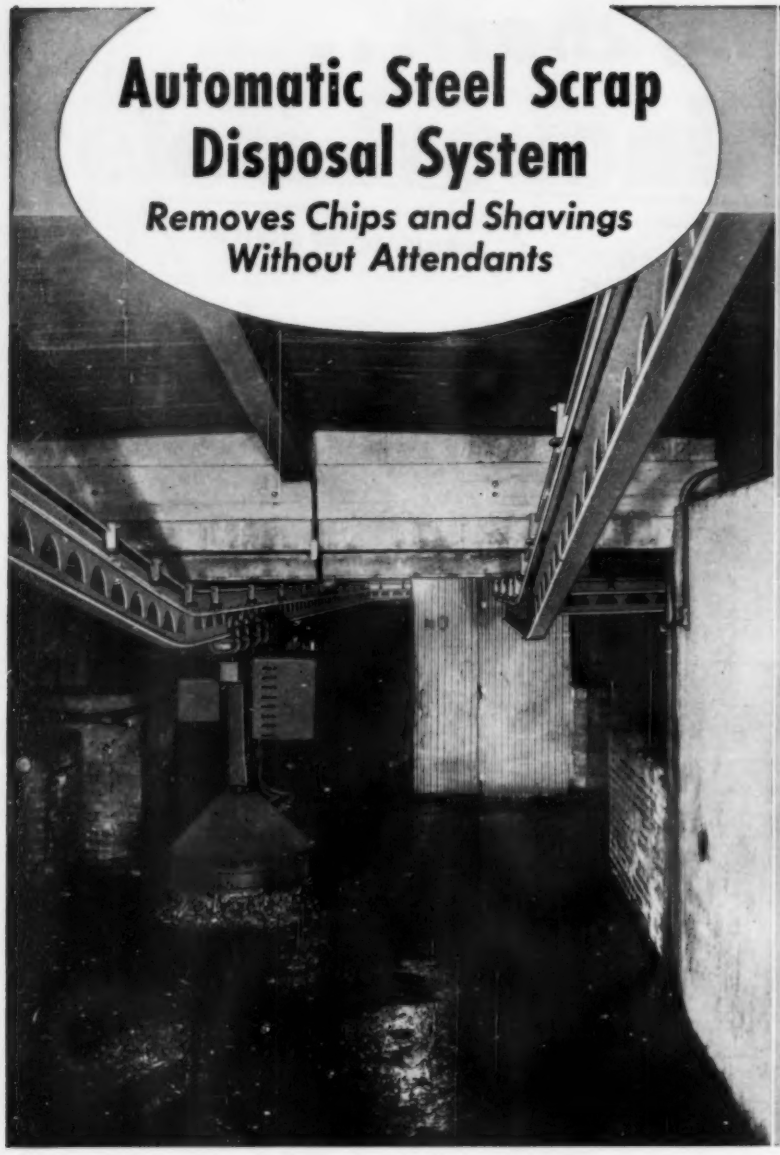
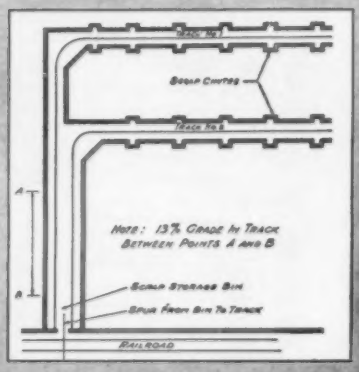
Automatic Steel Scrap Disposal System

Removes Chips and Shavings Without Attendants



View of tracks near beginning of tunnels. Carrier is shown approaching track incline on way to bin with a load.

A load of scrap about to be dropped in bin. Carrier immediately reverses after unloading and starts another trip.



ONE carload of metal chips and shavings is picked up and moved daily with an automatic Cleveland Tramrail magnet-carrying system that operates unattended in two parallel tunnels under metal-working machines.

Each tunnel has its own Tramrail track on which a magnet carrier travels back and forth, picking up scrap that comes down from the machines on floor above. The scrap is conveyed to a bin next to a railroad siding. The system was put into operation in 1942 and has proven an extremely efficient and low-cost method for ferrous scrap disposal.

GET THIS SPECIAL REPORT
Write us for your free copy of "AUTOMATIC DISPATCH PORTFOLIO" Gives data on a variety of cost-reducing automatic handling installations.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7585 E. 284 St., Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

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this patented

CLIP and STUD

makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

- ★ Easy, fast, low cost assembly.
- ★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.
- ★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.

There are many types of Lyon steel shelving. Above—a mezzanine (double decked) stockroom in which the lower installation supports the entire second floor. A big saver of valuable floor space.

LYON STEEL EQUIPMENT®

OVER 1500 ITEMS

For Business, Industry and Institutions

MAIL COUPON FOR THE 92-PAGE CATALOG

LYON METAL PRODUCTS, INC.
991 Monroe Avenue, Aurora, Illinois

☐ I would like to see a Lyon CLIP and STUD demonstration.

☐ I'd like a copy of your 92-page Catalog which tells the complete shelving story and covers entire line of products.

NAME_____

FIRM_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

A PARTIAL LIST OF LYON PRODUCTS

• Desks	• Storage Cabinets	• Bookcases	• Folding Chairs	• Sorting Files	• Tool Stands	• Cabinet Benches	• Display Equipment
• Tables	• Flat Drawer Files	• Coat Racks	• Service Carts	• Hopper Bins	• Tool Boxes	• Revolving Bins	• Hanging Cabinets
• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches

For more facts circle 558 on Reply Card

MOVIE: "STOP LOSS WITH ORGANIZED LUBRICATION," a new 20-minute color-and-sound film created to show the opportunities for cost control through Organized Lubrication.

EDUCATIONAL FILM PACKAGE for plant departments consists of movies on greases, hydraulic oils, cutting oils, etc., that may be selected after seeing the "Stop Loss" film.

HERE ARE THE TOOLS THAT CAN HELP YOU

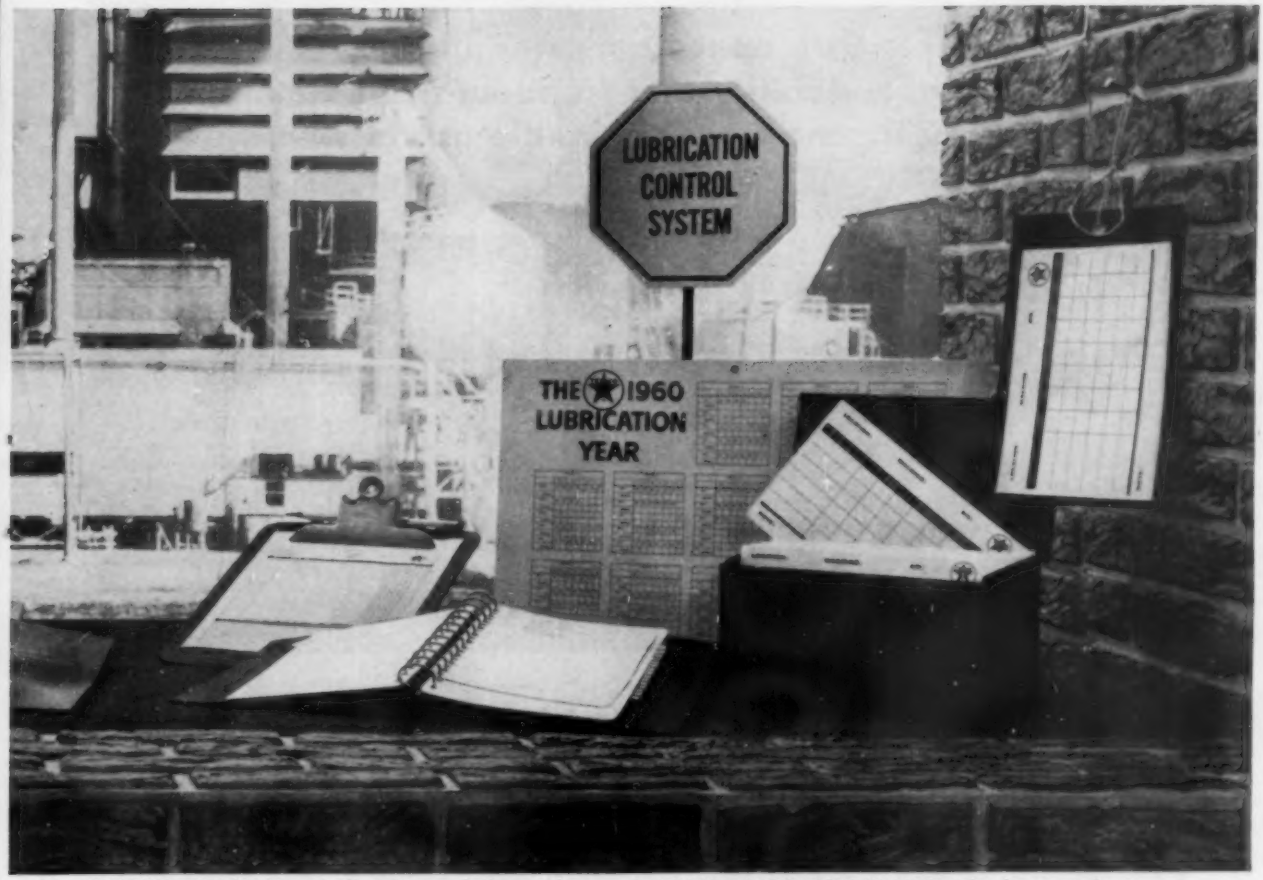
INCREASE YOUR NET PROFITS

Texaco's new "Stop Loss" program is designed to cut maintenance costs by modernizing lubrication practices. If yours is an average plant, the results can add 4 per cent to your net profit.

Even if your plant is an efficient operation, it is still virtually certain that there is an opportunity for cost control you are overlooking—either partially or completely. Here's what the Small Business Administration says in a recent publication:

Suppose there is an average plant, which sells $1,000,000 worth of goods per year. The net profit of this average company would be $73,400 and the maintenance cost would be $29,900. Now, suppose that by *better lubrication*, maintenance costs are reduced 10%, or $2990, *the $2990 will go directly into profit*—an increase of 4%.

A Texaco "Stop Loss" Program is designed for you. Texaco has developed a program specifically designed to help cut your maintenance costs via better lubrication practices. It will help you increase machine life, minimize downtime, reduce lube inventory, even cut purchasing costs. And the savings you make go directly into profits.



CO-ORDINATED BOOKLETS on the film subjects and others can be used as guides in specific areas.

TEXACO LUBRICATION CONTROL SYSTEM takes the guesswork out of your lubrication scheduling. It costs almost nothing to install, yet can add thousands of dollars a year to profits.

BY AS MUCH AS 4 PER CENT!

Can your plant pass this test? If the answer is "no" to any of the following questions, it is almost certain that a Texaco "Stop Loss" Program can improve your profit picture.

1. Is there a central source of responsibility in your plant for *all* lubrication? Yes ☐ No ☐
2. Can your machine operators devote all their time to production without worrying about lubrication? Yes ☐ No ☐
3. Is there any system for making sure that equipment gets lubricated in the right spots at the right time? Yes ☐ No ☐
4. Have you had a lubrication study made to eliminate costly duplication of lubricants? Yes ☐ No ☐
5. Are your oilers qualified men with knowledge of mechanisms lubricated? Yes ☐ No ☐

See for yourself how "Stop Loss" works! Texaco has just released a new color-and-sound movie to dramatize the benefits of good lubrication practices. It's called "Stop Loss through Organized Lubrication" and we think it would be valuable to you to see it. For a showing in your plant soon, mail in the coupon today!

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

MAKE YOUR RESERVATION TODAY!

TEXACO INC., Dept. E-161
135 East 42nd Street
New York 17, New York

I would like to see "Stop Loss through Organized Lubrication." Please call to arrange a showing in my plant.

Name_____ Title_____

Firm_____

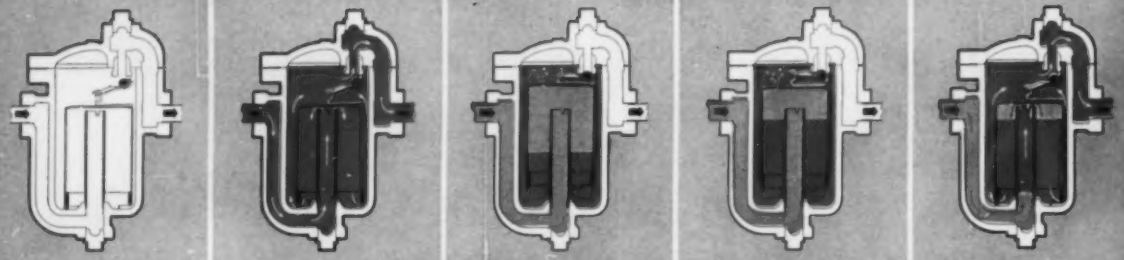
Address_____

City_____ Zone____ State_____

TEXACO

For more facts circle 559 on Reply Card

This simple trap operating principle provides the efficiency, dependability and freedom from maintenance necessary for the most profitable use of steam



When trap is first installed, the inverted bucket is down and the valve is wide open.

When steam is turned on, condensate (solid color) flows into trap and out through discharge orifice, until —

Steam (light color) reaching the trap floats the inverted bucket and closes the valve.

When more condensate enters the trap, the bucket loses buoyancy and pulls on valve lever.

When weight of bucket times leverage overcomes pressure on valve, bucket sinks and opens trap.

Key: condensate steam steam bubbles air bubbles

ARMSTRONG INVERTED BUCKET STEAM TRAPS

are designed and made to give you these big benefits:

● Amstrong Traps, the first inverted bucket steam traps, now represent the most advanced development of this time-proven principle. They provide all the advantages necessary for efficient, economical condensate drainage from virtually all types of steam using equipment.

1. *No steam loss* – Steam never reaches the orifice even when there is no condensate load.
2. *Automatic air elimination* – Vent in trap bucket passes air and other non-condensibles through to be discharged with condensate.
3. *No cooling leg required* – Condensate is discharged at steam temperature as fast as it reaches the trap because trap operates on difference in density between steam and water not on temperature.
4. *Operates on any back pressure* – Failure of one trap in system will not cause others to open because high back pressure does not affect an Armstrong trap other than to reduce capacity. As long as there is a pressure differential across the orifice the trap will close on steam and open for condensate.
5. *Unaffected by ordinary dirt* — Swirling action of condensate keeps dirt in suspension until discharged with condensate, prevents it from lodging in valve.
6. *Completely dependable* — Proved design plus the use of all stainless steel working parts assure continuity of service and length of service unmatched by any other trap.
7. *Big capacity in a small, economical package* — Armstrong design gives you the highest practical capacity for any given pressure. And remember, Armstrong capacity ratings are based on *hot* condensate at the *working pressure differential* stated, not on theoretical orifice capacities.

Further information on these advantages plus much additional information is given in the 48 page Armstrong Steam Trap Book. Ask your local Armstrong Representative or write direct.

860 Series for low pressure heating service. | 800 Series, side inlet, side outlet. | No. 801, side inlet, bottom outlet. | 880 Series, integral strainer. | 200 Series, bottom inlet, top outlet. | Forged Steel Series for high pressures, high temperatures.

The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS

9123 Maple Street • Three Rivers, Michigan

"See Our Catalog in Chemical Engineering Catalog"

For more facts circle 560 on Reply Card

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Contract for "Needs"

IN A SUIT brought by a purchaser against the manufacturer of tools, it was charged that the manufacturer had agreed to supply and the customer to purchase such quantities of goods as it would need. The manufacturer had failed to fill orders under this agreement.

In its defense, the manufacturer contended that the agreement was not a valid contract, that it lacked the consent of both parties and that since both parties were not bound to perform, neither was obligated.

"The contract to purchase from the manufacturer such amount of tools as the buyer would need possessed adequate mutuality of obligation," said the court, in rendering its decision against the manufacturer.

"It has been stated that mutuality of obligation means that both parties to an agreement are bound or neither is bound. However a contract need not be reciprocal as to every separate obligation. It is sufficient that it legally obligates both parties to abide by and perform its conditions.

"The want of mutuality is no defense where the contract is executed or where the party who is not bound to perform, does perform. The agreement ripened into a contract when the purchaser accepted the offer by placing orders of a specific amount. By their agreement the manufacturer must be regarded as continuously assenting to receive such performance in return for its own promise." Court brief 161 N.E.2d 345, Illinois, September 14, 1959.

Fraudulent Sale

WHEN a prospective purchaser inspected a power crane, it was represented by its owner as suitable for the operation of a ready-mix concrete plant. Also, that it was in excellent condition, had a 40-ft boom with a half yard bucket for loading sand and crushed stone and that the motor, clutch and brakes were in good operating condition.

After the crane had been purchased, it was found that the boom was only 30 ft and too light to handle a half yard bucket; the engine in poor condition, the tracks, rollers, sprockets as well as brake bands in dangerous condition.

Suit was brought by the purchaser for the recovery of his purchase money. The seller asked that the action be dismissed, on the ground that the purchaser by the exercise of reasonable diligence could have ascertained these facts for himself. In its refusal to do so, the Georgia court said,

"The elements necessary to be shown in such an action are that the representations of the seller were material and knowingly false, that they were made for the purpose of inducing the purchaser to enter into a contract, that he relied upon the false representations and was thereby induced to act and that he did so to his injury.

"If the sale is so tainted with fraud as to authorize the purchaser to rescind for fraud, upon such rescission an action may be maintained for the recovery of the purchase money." Court brief 108 S.E.2d 158, Georgia, March 11, 1959.

Trade Secrets

EMPLOYEES OF an alarm service were assigned the work of gathering and analyzing the information necessary for planning the protection of the premises of customers of the employer.

These employees ended their employment with this alarm service company in March, 1959, and undertook the organization of their own company for the conduct of a similar business. In the suit brought by the employer to prevent the disclosure of the information acquired by these employees while in his employment, an injunction was granted by the lower court and from that decision an appeal was taken by the former employees.

In affirming that judgment, the Supreme Court of the state said,

"The character of the secrets, if they be peculiar and important to the business, is not material. They may be secrets of trade or secrets of title or secrets of processes of manufacture or any other secrets important to the business of the employer.

"They, however, must be the particular secrets of the complaining employer, not general secrets of the trade in which he is engaged nor even the same secrets as those sought to be protected, if they be discovered by an independent investigation of outside parties.

"Where confidence is reposed and the employee, by reason of the confidential relation has acquired knowledge of trade secrets, he will not be permitted to make disclosure of those secrets to others to the prejudice of his employer." Court brief 154 Atl. 2d 494, Pennsylvania, September 29, 1959.

Acceptance of Bid

BID OF $35,397 by a subcontractor on a New York construction job was accepted by the prime contractor. Three days after the bid had been accepted, a discussion arose over the use of a hoist in raising materials to the upper floors of the building.

While the general contractor refused to provide the hoist, he agreed that if one was available at the job the subcontractor would be free to use it. Three months later the subcontractor refused to perform his contract unless this hoist was furnished.

At the end of six months when the subcontractor had performed no work on his contract, an agreement was made with another contractor for $50,000 and suit brought against the first subcontractor for the difference of $14,603. Judgment was in favor of the general contractor and the first subcontractor appealed.

In affirming the judgment, the appellate court said, "With some inconsistencies the subcontractor argues that there remains an element on which the parties never agreed. That element, absent from the contract in the theory of the subcontractor, was an agreement as to the hoist, but it seems clear beyond question that there was never any basis for argument that the proposal and acceptance, or either, contemplated that the general contractor would furnish such equipment." Court brief 189 N.Y.S. 2d 532, August 13, 1959.

Color in Unfair Competition

THE FEDERAL District Court in New York state prohibited the marketing of a pharmaceutical product using the color pink since that color had been adapted in the marketing of a similar product by a competitor. The manufacturer appealed.

In its reversal of this decision, the appellate court said that there was no violation of the competitor's property rights, notwithstanding that the manufacturer presumably used some of these marketing techniques.

"Such skills cannot be cornered,"

COURT DECISIONS

asserted the court. "The competitor must only refrain from using them in such a way that the public is misled. To say that it is unethical for the competitor to emphasize pink in its advertising merely begs the question, namely, can the color pink be monopolized in connection with a drug remedy?

"That a color may become someone's exclusive property as a perpetual monopoly in connection with a specific product has been rejected by the courts throughout the years. There are only seven primary colors. These colors have been used ever since man first noticed the rainbow." Court brief 271 Fed. 2d 569, New York, November 9, 1959.

Contract for Sale or Return

GOODS SOLD under a contract for sale or return are delivered to the purchaser with a right on his part to return the goods within a reasonable time and to be liable for so much of the value of the goods as he may retain.

A dealer sued to recover merchandise which the purchaser contended had been delivered under such an agreement. In suggesting the right of the purchaser to return this merchandise and be credited with its value, the court said,

"Under such a legal relationship the goods are sold and delivered to the buyer with a right on his part to return, at his option, all or part of the goods within a reasonable time or within a time specified in the contract and to be liable only for the balance he keeps.

"The exercise by the purchaser of his privilege to return the goods in accordance with such a contract absolves him of liability to pay for those returned or whose return is tendered and refused. Upon the seller's delaying or refusing to accept the return of the goods the purchaser holds them as the former's bailee or depository and is not responsible for their loss or deterioration in the absence of fault on his part." Court brief 111 So. 2d 900, Louisiana, May 1, 1959.

Independent Contractor

EMPLOYED TO remove a tree from the premises of a resident, the workmen allowed the tree to fall on a passing automobile. Suit by the owner of the automobile was brought against both the employer and workman. The action against the employer was dismissed by the Kansas court.

"The general rule is," said the court, in holding the owner of the premises free of liability, "that when a person lets out work to another, the contractee reserving no control over the work or workman, the relation of contractor and contractee exists and not that of master and servant and the contractee is not liable for the negligence or improper execution of the work by the contractor." Court brief 345 Pac. 2d 652, Kansas, November 7, 1959.

Salesman's Commissions

THROUGH THE efforts of a salesman the products of his employer had been listed in the catalogs of various distributors. However, before the publication of the catalogs, the salesman had been discharged. In its refusal to pay the commissions on subsequent sales made through the salesman's efforts, the employer maintained that it was the sale that fixed the right of the salesman to a commission, and that no commissions could be claimed by him after his employment had ended, irrespective of whether his efforts had effected the sale.

Of this defense, the Illinois court said, "This contention ignores a principle of law protecting salesmen in a position similar to this, where the salesman is discouraged prior to the culmination of a sale but after he has done everything necessary to effect the same.

"Thus the general rule recognized in this and other jurisdictions is that an agent or salesman who is the procuring cause of a sale is entitled to commission notwithstanding the fact that the sale was consummated by the principal personality or through another agent." Court brief 161 N.E. 2d 875, Illinois, October 26, 1959.

Patented Products

DEVICES KNOWN and sold under a trade name were the subject of litigation before the federal courts in Ohio. The owner of these patents charged another manufacturer with infringement. These instruments use the pulse echo ultrasonic method in the detection of flaws in metal parts.

The infringer asserted that the owner of the patents had forfeited its right to protection against infringement by the accumulation of patents in this field and the refusal to sell these devices for use by its competitors in commercial testing.

The Federal appellate court held that a patent owner is under no obligation to sell or use his patent, once it has been granted. "These alleged infringers," said the court, "concede that a patent is the grant of a right to exclude others from using the invention but they advance the novel argument that a refusal to sell the inventions for the purpose of preventing competition with the patent owner in their use, is an unlawful enlargement of the grants.

"Merely to state the argument is to expose its fallacy. The argument rests on the presupposition that by its exclusive use of the patented devices in its commercial testing business, this patent owner obtained an unfair advantage over its competitors.

To this statement the court added a quotation from a decision by the United States Supreme Court, that the "patent owner has no obligation either to use it or grant its use to others. If he discloses the invention in his application so that it will come into public domain at the end of the 17 year period of exclusive right, he has fulfilled the only obligation imposed by the statute." Court brief 171 F.S. 901, Ohio, January 6, 1959.

Oral Employment Contract

UNDER AN ORAL contract, a man was employed to work on commission for 10 years with the stipulation that the agreement ended upon his death should that event occur within that period.

By the Statute of Frauds of the state of Texas it is provided, "No action shall be brought in any court in any of the following cases . . . Upon any agreement which is not to be performed within the space of one year from the making thereof."

When the employer refused to pay the commissions earned by the employee, a suit was brought for breach of contract and this statute set up by the employer in his defense. In awarding judgment against the employer, the court said:

"Under the authorities when, under the terms of an oral agreement, an employment is to close on a contingency which may happen within a year, the oral agreement is not within the statute. The 'contingency' in the instant contract is the possible death of the employee within one year from the date of the contract.

"We think the parties had that contingency in mind when they agreed, 'This contract and agreement shall however terminate on the death of the employe.' In our opinion the contract was one which by its terms could have been performed, as that term is construed by the authorities, within one year." Court brief 328 S.W. 2d 817, Texas, October 23, 1959.

recipe for profit
Westinghouse
motor control recipe:
provides extra value with...
reserve capacity,
reliable operation,
matched to the job
performance
YOU CAN BE SURE... IF IT'S Westinghouse

TESTED RECIPES FOR PROFIT . . .

Westinghouse blends "hidden" ingredients in extra value controls for profitable plant operations

- Quality control
- Design ability
- Quality components
- Application experience
- Manufacturing know-how
- Maintenance facilities
- Extensive research

How does Westinghouse handle this basic control recipe to make the result superior to any other? The best chef knows that the quality of the ingredients used and the mixing knack account for the blue-ribbon winners.

At Westinghouse, highest quality control components plus a large portion of expert manufacturing skill, craftsmanship and experienced know-how are carefully blended. Such "hidden" ingredients mean industrial motor controls with reserve capacity to handle overloads . . . long, trouble-free service . . . and performance custom-matched to your needs. Qualities that give **more control value for your money.** Qualities more than sufficient to meet today's demands for extraordinary reliability. That's why it pays to look beneath the surface of any control to be sure you are getting Westinghouse quality.

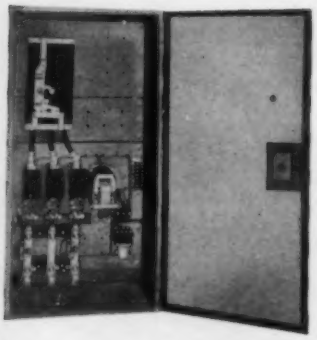
Your local Westinghouse representative is ready with a wide selection of industrial motor controls. Ask him to tell you more about their **hidden values** . . . benefits by the baker's dozen . . . for more profitable plant operations.

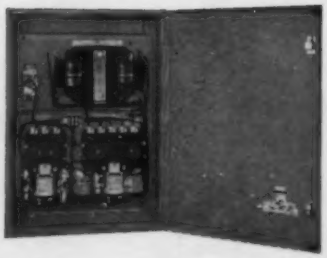
The proof of Westinghouse controls is in their using!

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE... IF IT'S Westinghouse

Check your favorite chef's best dish. The recipe calls for the finest ingredients. However, real success comes from devoted attention to details. Superior product quality, likewise, requires premium components and craftsmanship.





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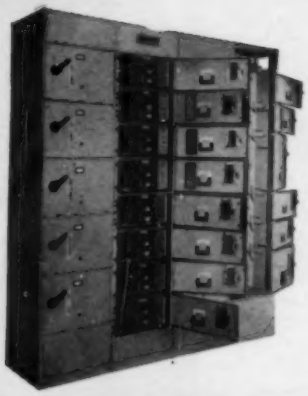


Control Centers

Compact grouping of all motor controls
cuts installation time;
frees production areas;
permits easy one-man
control supervision;
speeds maintenance and service.

Interchangeable modular construction.

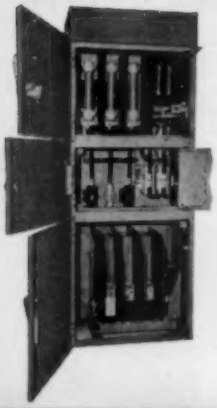
DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

Life-Line® Starters

Full-voltage, a-c magnetic starters in all NEMA enclosures.

Time-tested components . . . straight-through wiring, front-accessible parts combine to slash installation and maintenance costs.
proved De-ion® arc quencher increases contact life . . .
silver plated interchangeable contacts . . . clapper-type operating mechanism . . . smaller compact designs.

Single phase or polyphase; up to 600 volts — reversing or non-reversing;
Non-combination or combination with disconnects or circuit breakers.



Ampgard* High-Voltage Starters

Maximum protection for motors, systems and personnel.

Faults interrupted in less than ½ cycle . . . isolates fault to prevent shutdown of other equipment.

Completely front accessible.

Externally operated line isolating switch.

Exclusive mechanical and electrical interlock . . . prevents switch operation under load; automatically stops motor when cabinet is open.

Full line available . . .
for squirrel-cage, wound-rotor and synchronous motors up to 3000 hp — up to 5000 volts.

* Trade-Mark

Reduced Voltage Starters

Widest possible selection of primary resistor, auto-transformer, part-winding and star-delta types for squirrel-cage, wound-rotor and synchronous motors in all hp ratings — up to 600 volts.

Manual and magnetic starters to provide the proper starting characteristics for any application.

Available with integral circuit breaker or disconnect switch — fused or non-fused.

Enclosures available for every need . . .
general purpose . . . dust-tight industrial . . .
watertight . . . explosive atmospheres.

Available for immediate delivery.

Static Slipsyn® Synchronous Motor Control

Static transistor circuit guarantees . . . maximum reliability and accuracy; no moving parts to wear, corrode or fail; unaffected by contaminated atmosphere.

Motor field excitation applied at precise speed and pole position.

Adjustable pull-out protection, permits immediate detection or delays action to eliminate false tripping caused by transients.

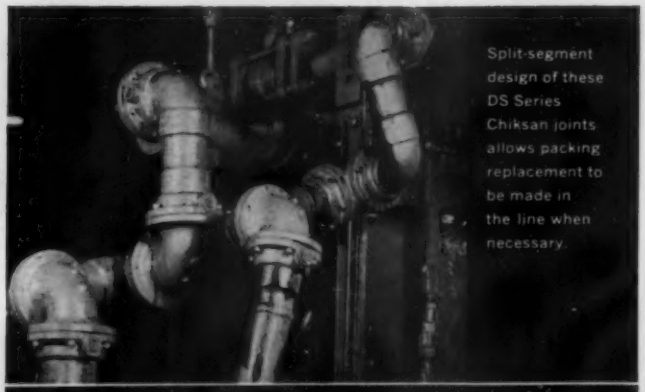
Available as complete starter or field conversion unit for **any make** control!

J-29604-3

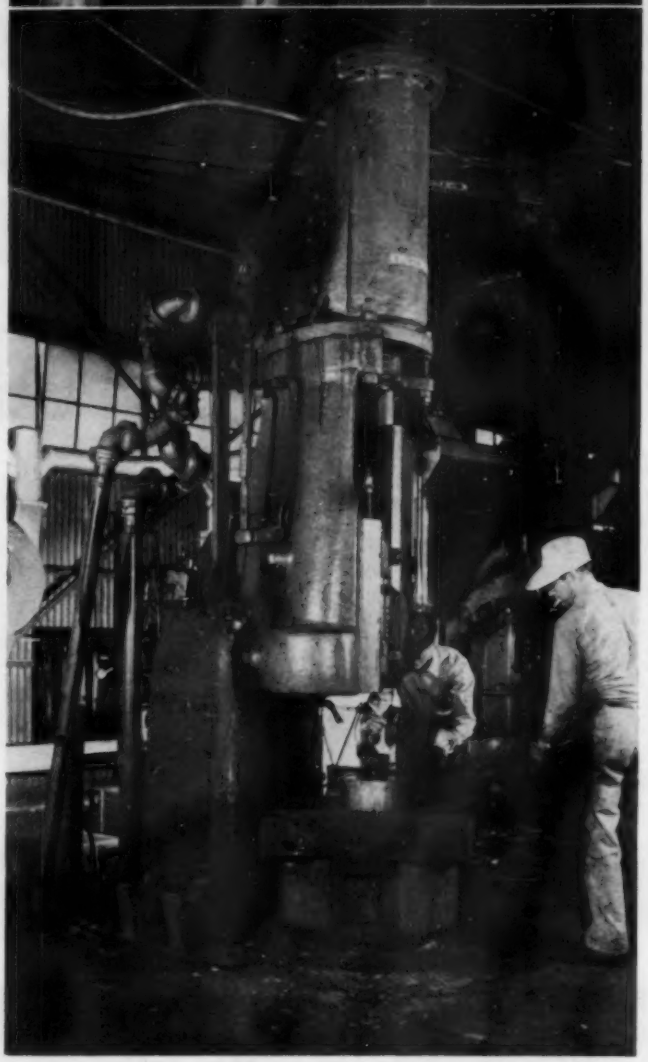
DESIGN SAFE, DURABLE FLEXIBILITY INTO YOUR LINES with CHIKSAN SWIVEL JOINTS

Whenever you apply Chiksan swivel joints, you get a line that lasts longer and reduces maintenance costs for years to come. Flexing in predetermined arcs, Chiksan joints eliminate common causes of line failure due to tight bends or torsional fatigue. Wherever certain designs require wide hose loops, Chiksan joints permit shorter, more compact lines. In fact, wherever fluid or air lines require flexibility, Chiksan swivel joints can provide a direct and lasting benefit.

Chiksan joints are available from stock in a wide range of materials, temperatures and pressures, to meet practically every design requirement. Write Chiksan Company, Brea, California, today for a catalog and the name of the representative in your area.



Split-segment design of these DS Series Chiksan joints allows packing replacement to be made in the line when necessary.

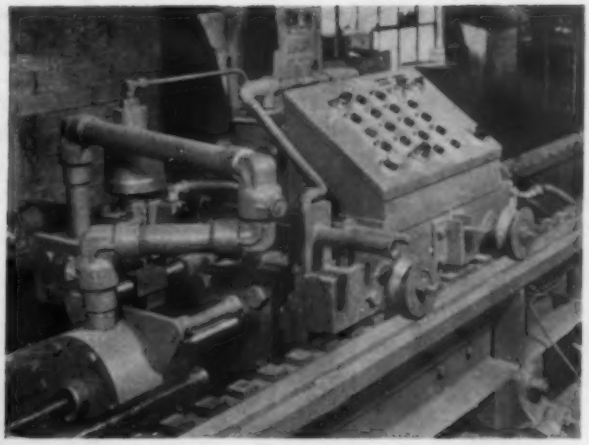


SHOCK, HIGH PRESSURE STEAM DOESN'T FAZE THESE CHIKSAN JOINTS—A 2000 pound dropforge with high pressure steam sets up a rough set of service conditions. These Chiksan swivel joints replaced flexible metal tubing which was going out in two and three weeks. Joints have been in service for over five months and customer reports good service to date, expects years more.

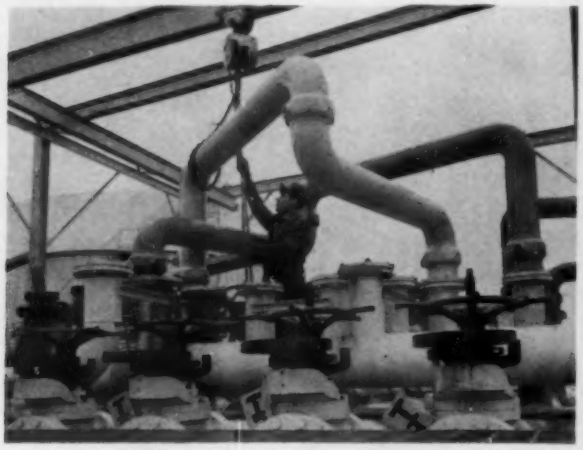
SEND FOR YOUR COPY OF THIS COMPREHENSIVE AND INFORMATIVE SWIVEL JOINT CATALOG.

← For more facts circle 561 on Reply Card

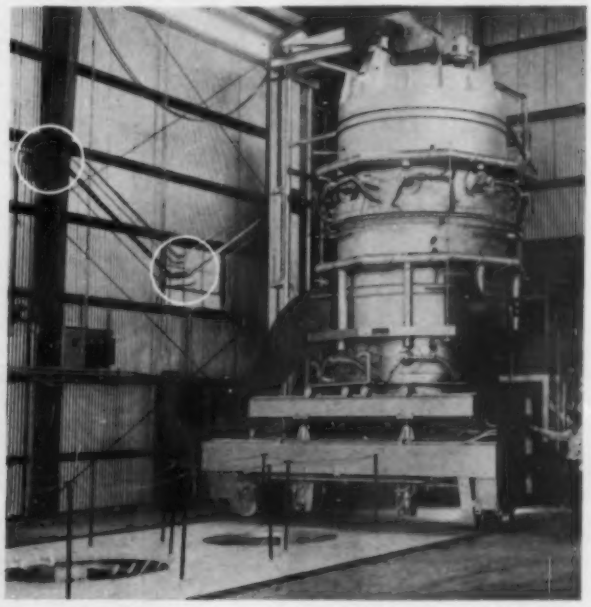
FLEXIBLE CHEMICAL LINES? CHIKSAN HAS THE ANSWER—Providing needed safety for a loading arm to handle sulfuric acid (as this Chiksan joint is doing) or most any chemical is an everyday occurrence with Chiksan joints. Over 2000 different types, styles and sizes in a variety of temperature and pressure ratings are available for your design needs.



RUPTURE PROOF LINES FOR HIGH PRESSURE HYDROTESTING—Critical lines take on a new measure of safety with these flexible steel swivel joints. In service on a pipe testing machine, these lines receive up to 1000 pounds of pressure and more every five seconds as lengths of new pipe move through the testing machine. Only occasional service is required to keep these joints in top working condition.

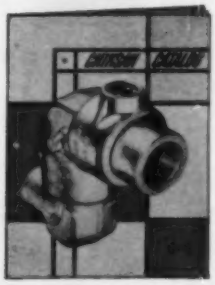


SWIVEL JOINTED JUMPER SYSTEM SOLVES MANIFOLD PROBLEMS—Moving large quantities of differing liquids from barge to storage tanks posed a problem. A closed system wasn't practical because of contamination due to leakage or accidental opening of a valve. Use of a Chiksan swivel jointed jumper system provided a solution that eliminated cross contamination.



CONSTANT FLOW CHARACTERISTICS ALLOW PRECISE CONTROL—Heat treating furnaces require exacting temperature control. Previous experience with flexible hose indicated too much variation in flow characteristics. By using swivel joints and metal piping, company engineers were able to design a supply line system that insured desired control.

#60-54



fmc **CHIKSAN** COMPANY • 330 NORTH BREA BLVD., BREA, CALIFORNIA

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Please send me a copy of your latest catalog.

Name_____ Company_____

Title_____ Address_____

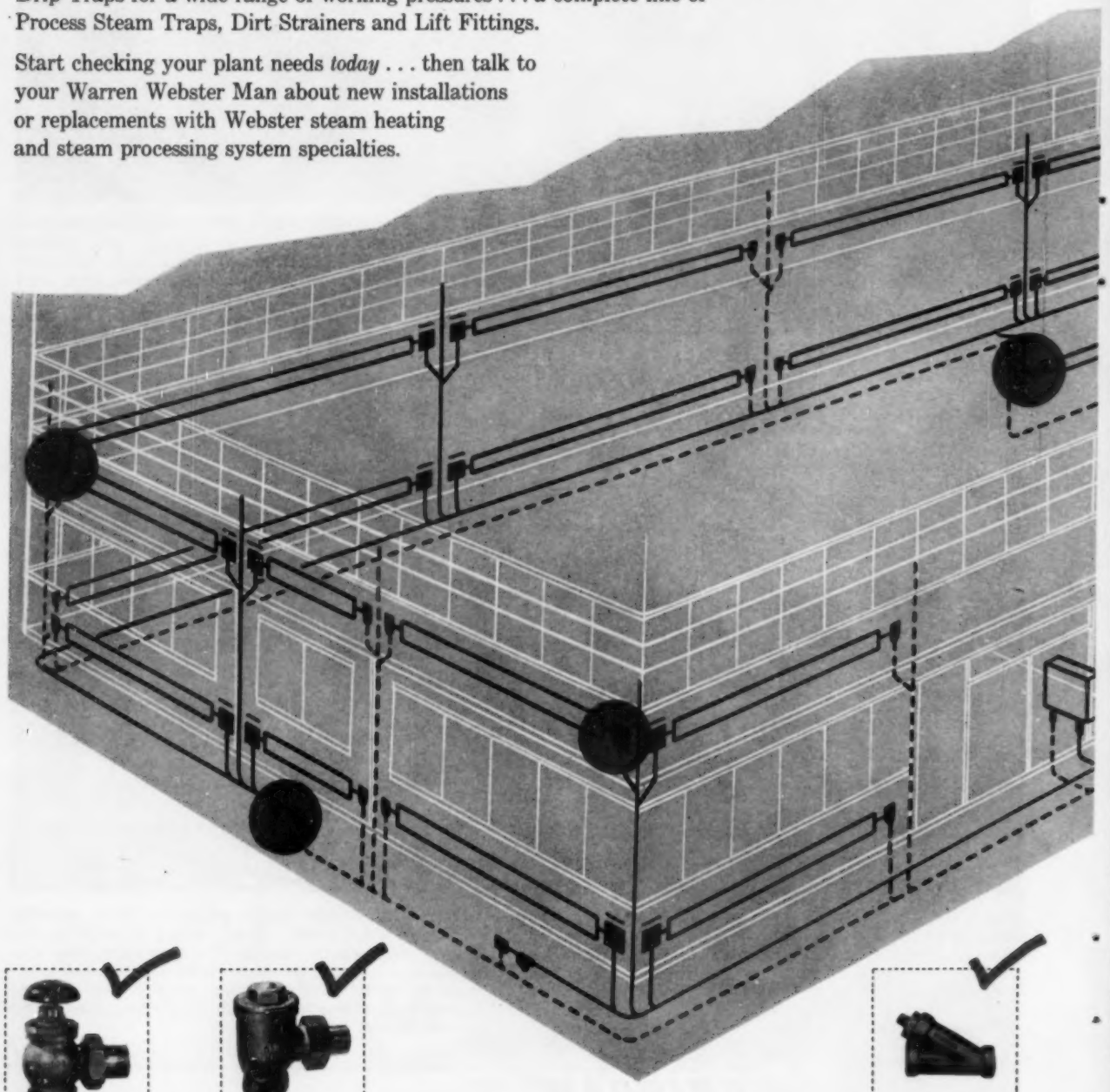
City_____ Zone_____ State_____

For more facts circle 562 on Reply Card

CHECK FOR STEAM

Webster makes a complete family of steam specialties to meet every plant engineering need. Webster steam heating products include Webster Thermostatic Traps for low and high pressure vapor and steam heating, Radiator Valves and Floats and Thermostatic Drip Traps for a wide range of working pressures . . . a complete line of Process Steam Traps, Dirt Strainers and Lift Fittings.

Start checking your plant needs *today* . . . then talk to your Warren Webster Man about new installations or replacements with Webster steam heating and steam processing system specialties.



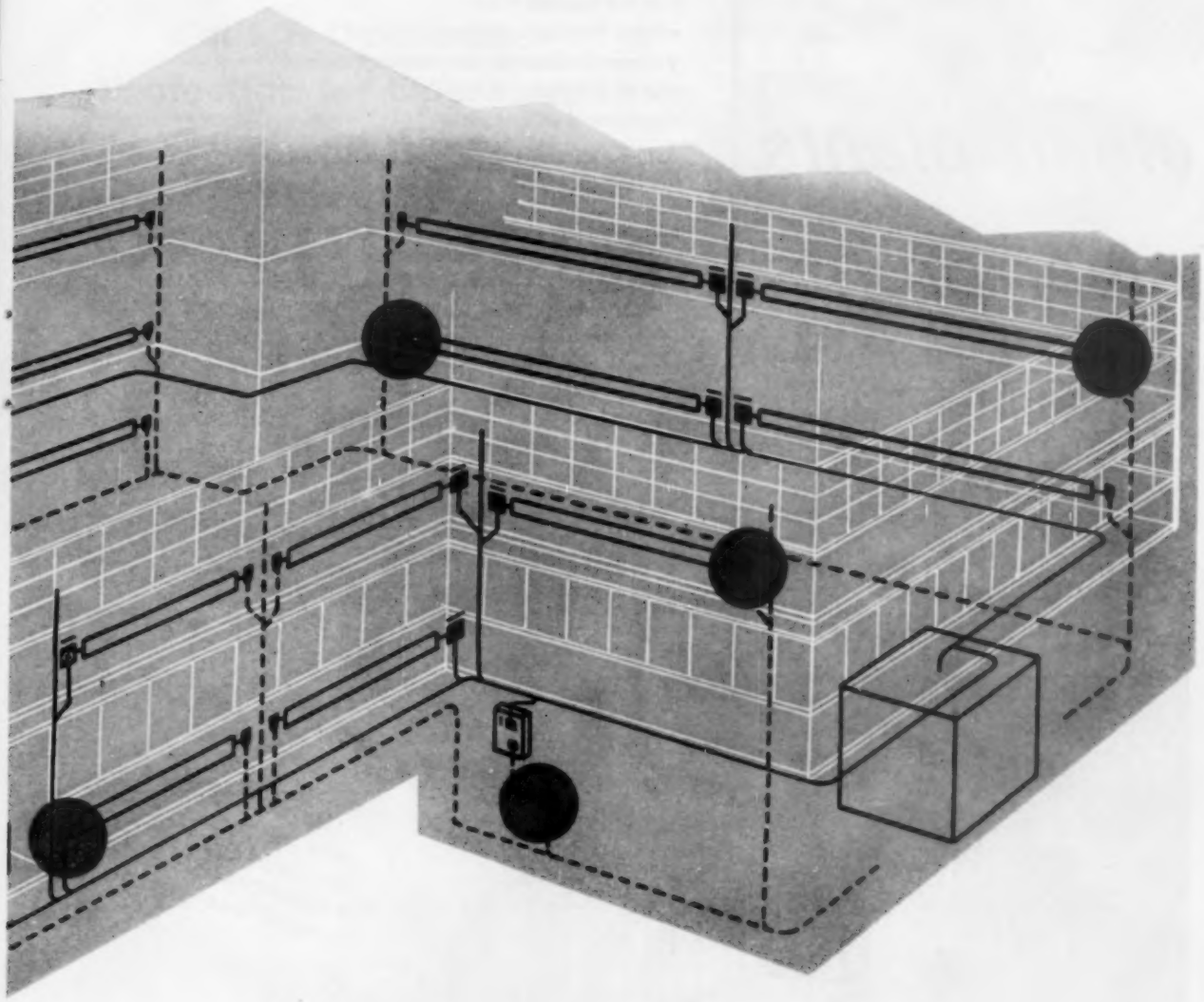
Ser. 600S Sylphon Bellows Radiator Supply Valve

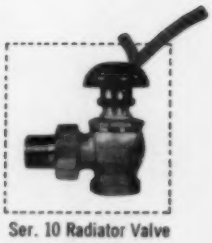
Ser. 5 Sylphon Thermostatic Trap

Dirt Strainer

ASK THE WARREN WEBSTER MAN ABOUT THE WEBSTER PREVENTIVE MAINTENANCE SYSTEM

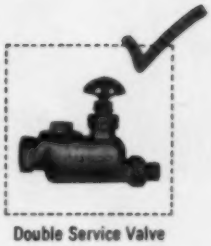
SYSTEM EFFICIENCY NOW



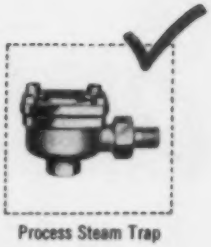


Ser. 10 Radiator Valve

Ser. 7 Thermostatic Trap



Double Service Valve



Process Steam Trap

Thermostatic Drip Trap

WARREN WEBSTER & COMPANY, INC.

HEATING • COOLING / CAMDEN 5, NEW JERSEY

For more facts circle 563 on Reply Card

clean plants, clear profits

with Dracco Multi-Bag Filters

Freedom from dust in your plant can mean:

- **lower plant maintenance and cleaning costs**
- **less abrasive wear on machinery**
- **no raw material waste**
- **better working conditions**
- **improved manpower and machine efficiency**
- **no air pollution**
- **guaranteed product purity**

High-efficiency cloth filtration with Multi-Bag Filters can help you clear the way for profits in any or all of these areas. Wide range of standard sizes permits engineering to meet almost any dry collection requirement. Units can be installed in or out of the plant. Operation may be intermittent or continuous, depending on dust loads and degree of automation desired. Long-life filter bags are available in any type cloth, natural or synthetic.

Freedom from maintenance is another benefit that helps you clear extra profits. Simplified, rugged, design with few moving parts keeps Dracco maintenance costs lowest in the industry, year after year.

For full information on Multi-Bag Filters, and other units in Dracco's complete line of dry collection equipment, write: Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors dust control equipment

SPECIAL COLLECTORS
Dracco is also experienced in design and fabrication of large custom-built collectors, using glass or other synthetic cloth bags, to solve extremely severe or unusual dust problems.

Typical Multi-Bag Filter system at large eastern processing plant shows how standard units can be grouped together to provide unlimited capacities.

For more facts circle 564 on Reply Card

New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

• Now, for the first time on any electric hoist, you can have safe, sure, mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

***See your WRIGHT Distributor** about the Speedway Electric Hoist line or write us for Catalog E-58*

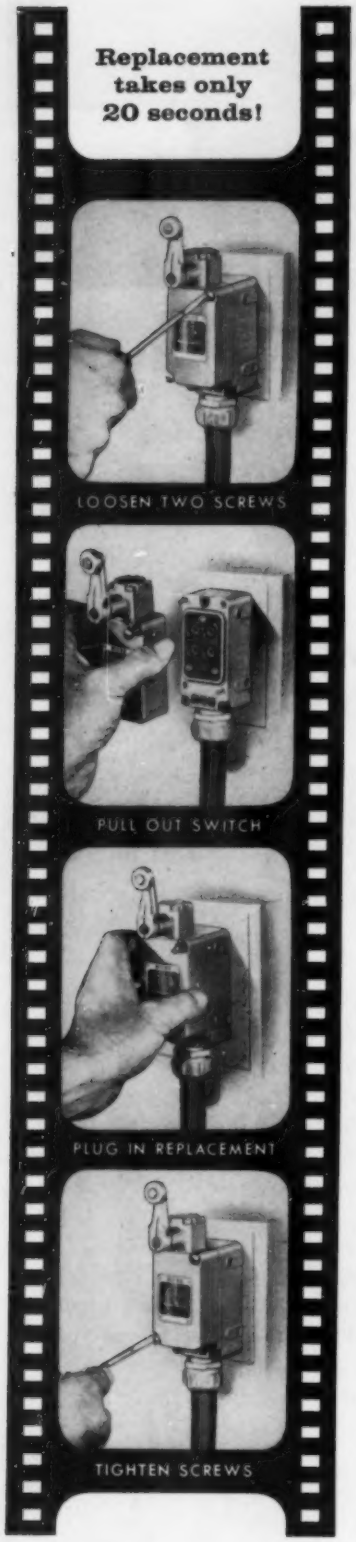
WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 565 on Reply Card

ACCO



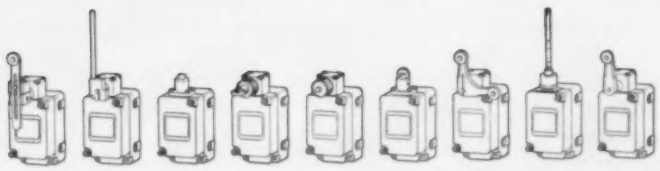
MICRO'S "Plug-in Limit" switch saves production time, adds new versatility!

The "200LS" series switches can be replaced in just 20 seconds. In some applications where limit switches take abnormal abuse, production engineers have actually translated this time savings into as much as a 6% increase in production. Replacement is as easy as plugging in a radio tube.

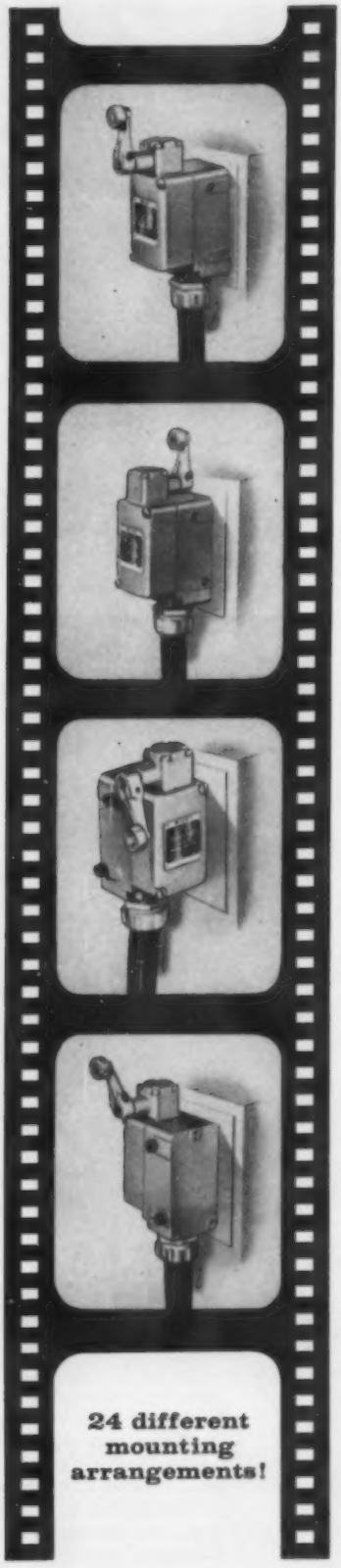
These "Plug-in Limit" switches have many other advantages. You can automatically disconnect any station on your production line by simply pulling the correct plug-in switch. Nine different actuators are available, and all fit one receptacle size. Thus receptacles need not be replaced, and you simply plug in your choice of actuator quickly and easily.

One basic switch is interchangeable for all models in the "Plug-in Limit" series.

MICRO SWITCH offers the largest selection of plug-in switches available. Ask your MICRO SWITCH distributor to show you these timesavers. You'll appreciate their rugged, simple construction, and he can show you how they can save you money on your production line.



MICRO SWITCH Precision Switches



The inside story . . . timesaving simplicity!

The spring plugs are integrally molded to the precision snap-acting switch body. Plug-in action is safe and sure due to the sturdy, molded barriers which protect the plugs. The rugged terminal receptacle has heavy No. 8 terminal screws for easy wiring. The best of protection from oil-tight seals between head and body, on actuating shaft and around the receptacle opening. Actuator head mounts in four positions. MICRO SWITCH reliability plus the plug-in design make this the most effective limit switch available. Write for Catalog 84 which describes our entire series of industrial limit switches.

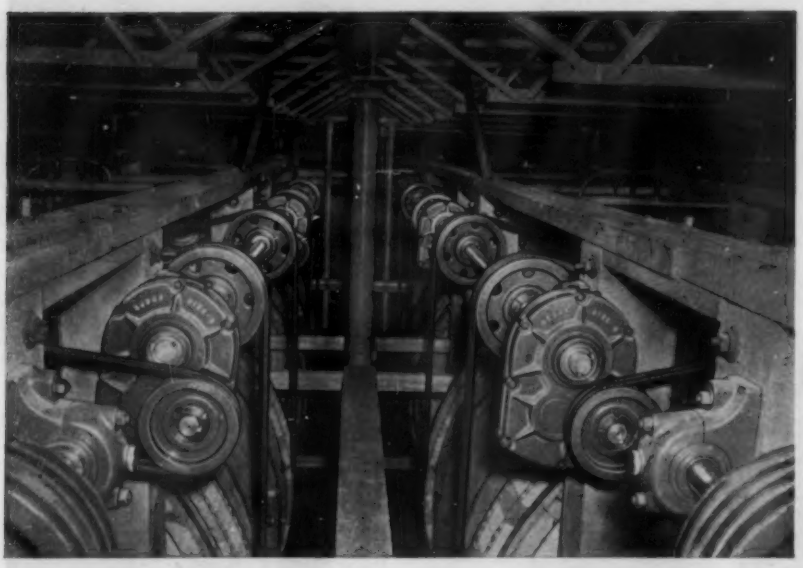
MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH Precision Switches

24 different mounting arrangements!

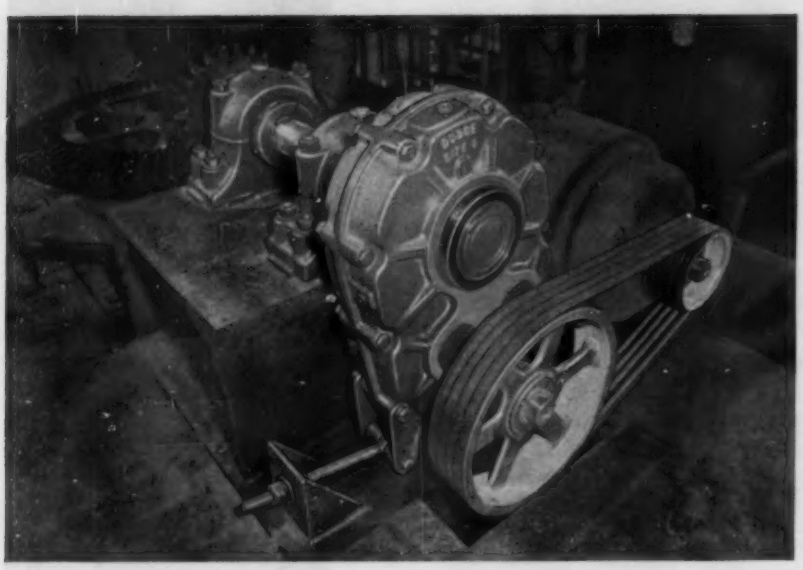
75 YEARS HONEYWELL PIONEERING THE FUTURE

For more facts circle 566 on Reply Card



DODGE TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

Install it anywhere—with minimum time and effort. Here is an overhead installation on tanning drums. Torque-Arm reducers are resistant to acid fumes, salt water environment, moisture.



DODGE TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

Can be positioned any place on the entire length of the shaft. It locks into place on *both* sides of the housing. Note modified torque arm on this installation on a mixer in a beverage plant.

The Speed Reducer Idea that

Two things account for the record popularity of Dodge Torque-Arm Speed Reducers. First, they cost less to install since they require no foundations, sliding motor rails or flexible couplings. Second—and most important—these modern reducers as developed by Dodge perform *brilliantly*. Tens of thousands of installations underscore Torque-Arm dependability. Torque-Arm is America's *quality* shaft mounted speed reducer!

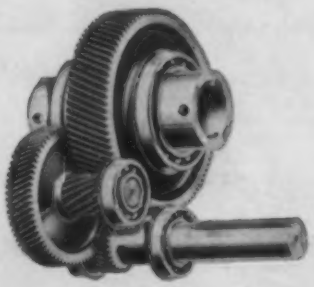
Torque-Arm has been so extensively adopted by industry that today models are available for a vast range of applications. The Torque-Arm line offers you capacities up to 170 hp—output speeds from 10 to 400 rpm—in single and double reduction series—with 5 to 1, 15 to 1 and 25 to 1 ratios. Models for vertical or inclined shaft operation are available—as well as special-application versions such as flange mounted, right

Rugged semisteel housing— a solid backbone for solid service

Here is a tough, corrosion-resistant housing with the strength to hold bearing seats in line for the life of the unit. Perfect shaft and gear alignment are assured by doweling the matched halves together and boring in line. No gear is overhung. Loads are carried easily, contributing to Torque-Arm's long life and high efficiency—97% in double reduction models, almost 99% in single!

AGMA rated gears— quality-guarded by continual tests

These helical gears have soft cores to withstand shock—and hardened surfaces to resist wear. Their quality is guarded in manufacture and assembly by the most modern methods of quality control, including inspection for runout, tooth spacing, helical lead and involute profile. They run quietly, mesh precisely. Teeth are crown shaved for maximum contact area. Gears are shrunk on their shafts to prevent shifting.



Modern double-lip seals keep oil in and dirt out

Modern synthetic, double-lip seals of the highest quality keep oil in and dirt out of the reducer case. These seals offer protection for the unit from dust and dirt and just as effectively insure cleanliness when operating in laundries, textile mills, food processing plants.

Re-ally Clicked!

angle and extended input shaft styles. Optional equipment includes a positive, sealed-in backstop and a positive overload release.

Ask your local Dodge Distributor. Or write us for our 64-page Torque-Arm Speed Reducer Bulletin, complete with engineering data and easy selection tables.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

For more facts circle 567 on Reply Card

At Mount Rushmore National Memorial in South Dakota small fissures in the sculptured faces of Washington, Jefferson, Lincoln and Roosevelt are being sealed with granite dust and white lead. Though the granite sculpture is estimated to last for thousands of years, this preventive maintenance will keep the surfaces smooth and slow the natural erosion process. The insert shows how workmen are suspended on Union Wire Rope.

Tuffy is an old hand at new ideas

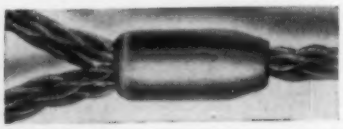
Whether it's better equipment for drilling deeper oil wells, or doing a "preventive maintenance" job like the one shown above, new needs for slings and wire rope are constantly coming along.

Tuffy meets these needs with products perfectly "tailored" to the job at hand. Products that give the ultimate in working efficiency, safety and long service life — at the ultimate low cost.

In Union research laboratories the quest is continuous for new ideas and new ways of making wire rope and slings. It's been that way for more than 30 years. Out of that research have come such important advances as Tuffy's 9-part machine-braided sling, famous for its unmatched combination of strength and flexibility.

Here are Tuffy "extras" you get at no extra cost

Tuffy's patented 9-part machine-braided fabric is a marvel of strength and flexibility. It makes knotting and kinking next to impossible. If a kink should occur, it's easily smoothed out, leaving no permanent damage.



Tuffy's pressed-on metal ferrule gives the tucked eye splice 100% of fabric strength. It's applied under tremendous hydraulic pressure — and streamlined to eliminate snags that might injure hands and arms.

For products you trust, service you rely on, the man to see is your Tuffy Distributor. Look him up in the Yellow Pages.

Tuffy® Tips
—on safe use of
Slings and Hoist Lines

Safety in Hoisting Saves Costly Injuries

During a recent 12 months period, back injuries resulting in lost time totalled 32,643 in one state (California). Lost-time injuries caused by strain or over-exertion: 24,639. A high price to pay—in misery and money—for lifting, pushing and carrying loads.

Proper hoisting equipment, properly used and maintained, is one important answer to this injury problem. It may save your workers disabling accidents, and save you expensive absenteeism and lost production.

Rules for Safe Use of Hoists

1. *Don't let muscles* do what a proper size hoist should do.
2. *Adequate hoists* aren't expensive. With proper slings and hoist lines, they will help a lot in reducing injuries to workers.
3. *Use the right sling* and hoist line for the job. Tuffy slings and hoist lines are tailored to every need, from the smallest block and tackle to giant cranes and other equipment.
4. *Don't assume* that all slings are right for all kinds of lifting. Your Tuffy distributor will help you select the right ones.

FREE!
New Tuffy Sling Handbook

Covers the subject from A to Z. All types, weights, dimensions, rated loads and other data for slings and sling fittings. Write **Union Wire Rope Corporation, 2272 Manchester Ave., Kansas City 26, Mo.** Specialists in high carbon wire, wire rope, braided wire fabric and stress-relieved wire and strand.

5

UNION UNION ROPE WIRE *Wire Rope*

ARMCO®

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

For more facts circle 568 on Reply Card

"MAINTENANCE DOLLARS BECOME PROFIT DOLLARS— WHEN YOU SPECIFY DU PONT PAINTS!"

Jack Graham ought to know. As a member of Du Pont's special Technical Service Group, he's seen his recommendations pay off in terms of long-range cost reductions and job satisfaction for a variety of clients. Says Jack:

"Profit dollars are hard to come by. That's *one* reason Du Pont's systems of maintenance painting can be so important to *your* operation. We help you turn maintenance dollars into profit dollars. For instance, at a normal profit margin of 5%, $50,000 in savings—made possible by top-quality Du Pont finishes and technical assistance—is equivalent to the profit on an extra $1,000,000 of sales!

"Naturally, to realize maximum return on your maintenance dollar, quality paints are a *must*. Too many maintenance men have discovered, belatedly, that initial purchase price is an inaccurate determinant of value. Equally important are such factors as applied cost and job life. Which brings us to *another* reason why Du Pont paints are so often specified.

"You see, we spend enough time in your plant, examining equipment and conferring with maintenance personnel, to get a thorough understanding of your particular problem. Then we help you develop a step-by-step program geared to achieve maximum protection against every corrosive condition—*at lowest cost per square foot per year.*"

If you have a maintenance problem you'd like to talk over with an expert, there's a man like Jack Graham—skilled, experienced, a "pro" in his field—ready to serve you. Just call your local Du Pont district sales office. Or write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. PE-69, Wilmington 98, Delaware.

* * *

Trained as a chemical engineer, J. A. Graham joined Du Pont 15 years ago. Since then, he's devoted his time and talents to becoming a specialist in the field of industrial maintenance painting. In Detroit, Cleveland, Los Angeles and Philadelphia, he's helped solve problems of paint maintenance for the automotive, aircraft, steel, petroleum and marine industries. Now Eastern District Manager, Industrial Maintenance Sales, Jack is a member of the Corrosion Engineers Society.

DU PONT PAINTS

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

For more facts circle 569 on Reply Card

PERFECTION **Infra-Red GAS Heaters** SCHWANK

Startling savings of $9892 in fuel costs in one year's operation plus a wonderful new kind of heating comfort are big reasons Perfection Schwank Gas Infra-Red Heaters rate high with Youngstown Foundry and Machine Company, Youngstown, Ohio. Listen to these comments:

"Heating a 60 year old building like this is a tough job", states James Paumier, Plant Superintendent, "but this Perfection Schwank system gives us a constant and comfortable 65° temperature, drastically cut our fuel cost and requires practically no maintenance."

Wayne Thew, Foreman, exclaims, "I've been here for 20 years and Perfection Schwank Infra-Red is far superior to any other heating system we've tried. Castings and machinery are

Part of the 41,160 square feet of floor space at Youngstown Foundry and Machine . . . all heated by Perfection Schwank Gas Infra-Red Heaters.

cut heating bill $9,892 . . . give Youngstown Foundry and Machine "Best Heat Ever!"

always the same temperature eliminating expansion and contraction problems and making tolerances much easier to meet."

States Joseph Sagy, Plane Operator: "Since we've had these Infra-Red heaters, there are no drafts, no hot and cold spots . . . in every way they're a big improvement over our previous heating system."

Acceptance like this makes it easy to understand why there are over 25,000 users of Perfection Schwank Gas Infra-Red Heaters.

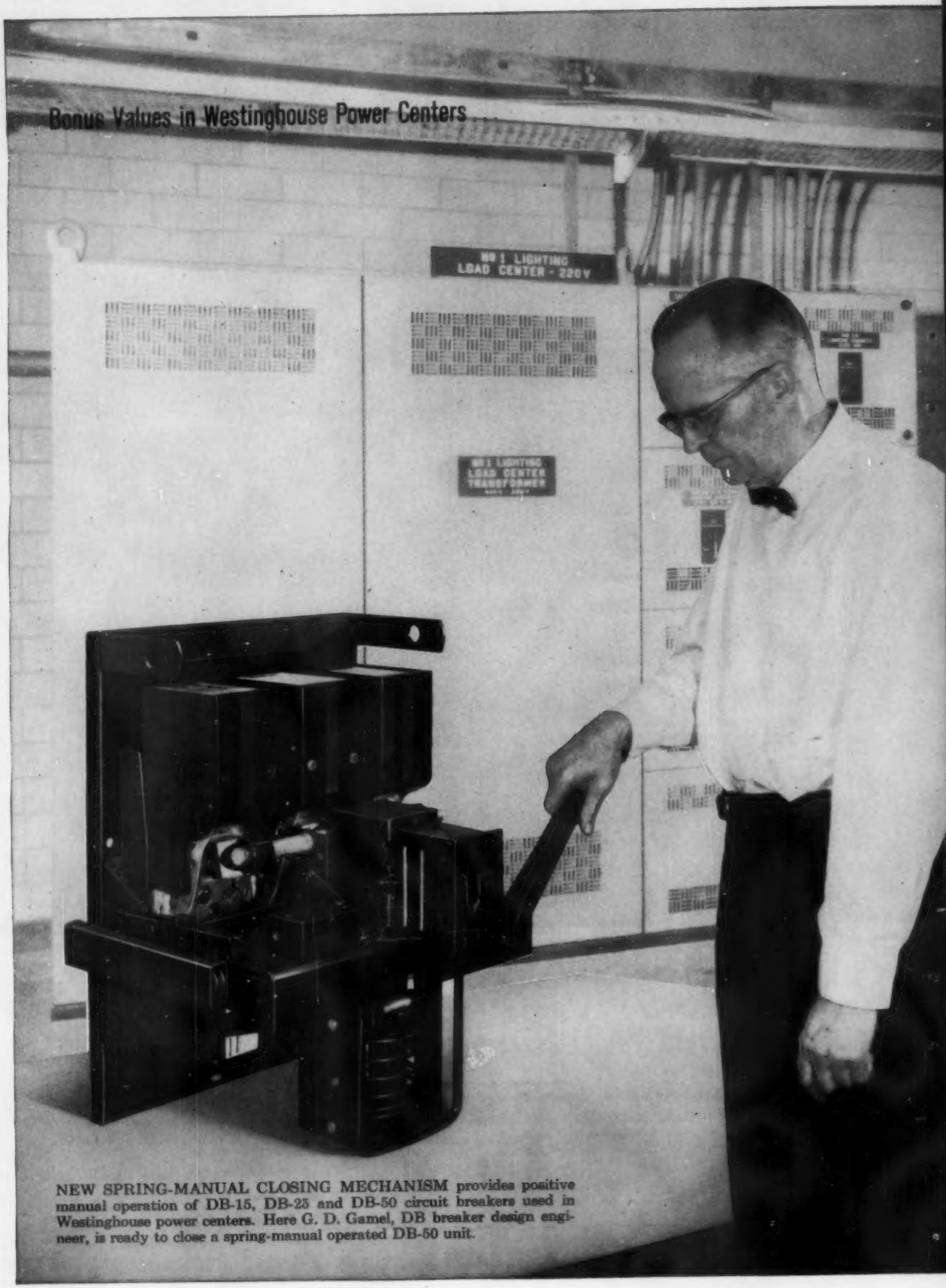
Approved by A.G.A., Underwriters, C.G.A. and C.S.A.

Under Schwank U.S. Patents 2,775,294 and 2,870,830 and pending applications.

PIONEERS IN GAS INFRA-RED HEATERS

PERFECTION 1135 Ivanhoe Rd., Cleveland 10, Ohio

division of **Hupp Corporation** / licensee of **American Infra-Red Radiant Co.**



NEW SPRING-MANUAL CLOSING MECHANISM provides positive manual operation of DB-15, DB-25 and DB-50 circuit breakers used in Westinghouse power centers. Here G. D. Gamel, DB breaker design engineer, is ready to close a spring-manual operated DB-50 unit.

Westinghouse power centers offer greatest component selection... plus new switchgear insulation

You Can Choose the Breaker Operation You Need. Low-voltage air circuit breakers (DB-15, DB-25 and DB-50) provided in Westinghouse power centers are now available with a choice of manual, spring-manual or electric closing mechanisms. In accordance with industry standards, DB-75 and DB-100 breakers are available with an electrically operated closing mechanism only.

You Can Choose the Transformer You Need. As with breaker closing mechanisms above, Westinghouse gives you complete freedom of choice in selecting the power center transformer best suited to your application. Within code limitations, you can choose *oil-filled* for outdoor service . . . *Inerteen®-filled* for outdoor or indoor service where a nonflammable, liquid-cooled transformer is desirable . . . *ventilated dry-type* for maximum safety and minimum maintenance under controlled atmospheric conditions, indoors . . . and *sealed dry-type* for complete safety and virtually no maintenance, under adverse atmospheric conditions, indoors or outdoors.

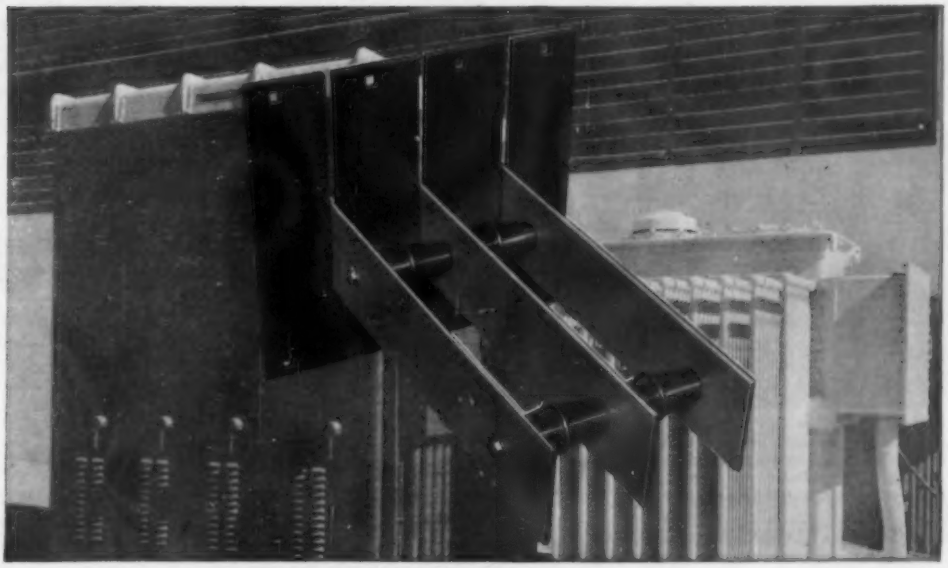
New Westinghouse Insulation of improved glass polyester material is used for bus supports and short circuit bracing in Westinghouse low-voltage metal-enclosed switchgear. In addition to being highly track resistant, this new insulation is also flame retardant, and the design of supports and bracing provides increased vertical creepage distances. Result is maximum safety with minimum maintenance.

These features are only a few of the continuing product improvements that provide true bonus values beyond specification in Westinghouse power centers. For complete details, call your Westinghouse representative—or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60979

YOU CAN BE SURE...IF IT'S Westinghouse

NEW WESTINGHOUSE GLASS POLYESTER INSULATION is used for bus supports and bracing in low-voltage metal-enclosed switchgear of Westinghouse power centers.



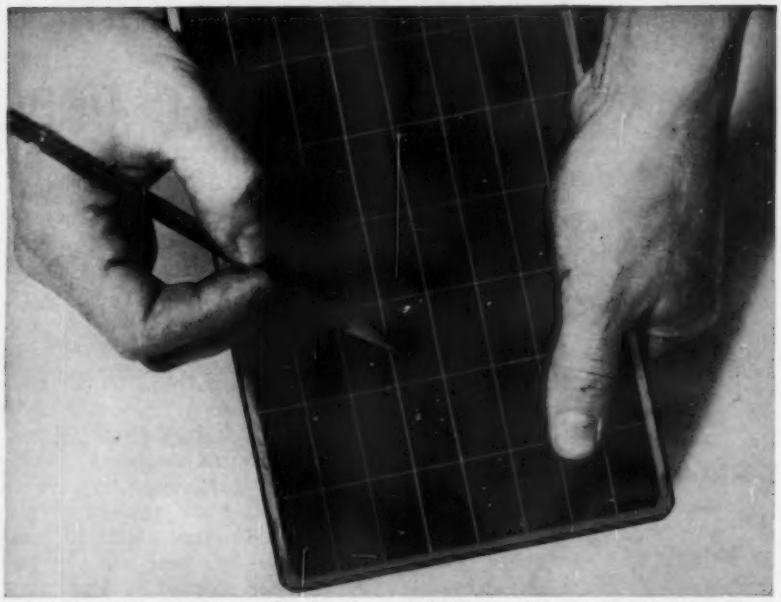
For more facts circle 571 on Reply Card

(Advertisement)

New C&D AccuPak*

plates improve battery performance; increase life!

Automatic nuclear control holds plate uniformity to finest possible tolerance; provides 100% inspection!



Precise weights and amounts of lead oxides must fill the especially cast battery plate grids to assure the maximum capacity and electrical characteristics.

Electric truck battery users will find three major advantages in C & D *Slyver-Clad*® batteries containing the exclusive, new *AccuPak** plates:

1. Extra long life—because of longer, thicker plates.

The true final determinant of battery life is the amount of metal in the grids. C&D batteries outlast any other battery because they have the heaviest, thickest plates made. The maximum cross-sectional area grid is cast by a special process that eliminates flaws, shrinkage, cracks, and dross inclusions.

2. Extremely uniform *AccuPak* plates; no low cells; high capacity to end of life—due to *AccuRay* control of pasting.

C&D uses *AccuRay*** to automatically control the amount of active materials going into the grid structures of *both positive and negative plates!* C&D is the only industrial battery manufacturer using *AccuRay* control.

The use of *AccuRay* to control the pasting operation means that plates have maximum uniformity of weight, density, and thickness of active material. *AccuRay* controls uniformity to within ±½% and automatically subjects every plate to a 100% inspection.

Exclusive *AccuRay* control—another C & D first—once again sets the pace for the battery industry. *AccuRay* automatically controls weights of all battery plates to a point of uniformity heretofore impractical.

3. No life-shortening nor capacity drop-off due to sediment build-up—because of *Slyver-Clad*® insulation and retention.

The longer, heavier, more uniform plates are then wrapped with the time-proven C&D *Slyver-Clad* five-fold insulation. This consists of a layer of extremely fine parallel glass filaments or sliver, a vertical glass wrapping, a horizontal glass wrapping, a perforated plastic retainer, and finally a microporous rubber separator.

The combination of these five layers of retentive materials virtually eliminates shedding, or loss of active material, with its accompanying life-shortening build-up of sediment in the bottom of the container. Thus, a huge bottom sediment space is not needed. C&D fills this space in standard containers with the heaviest, thickest plates available in any industrial battery.

For full information on C&D *Slyver-Clad* batteries featuring *AccuPak*, write for Bulletin IT-530.

C&D BATTERIES
of Conshohocken, Pa.... Attica, Ind.
DIV. THE ELECTRIC AUTO-LITE CO.

Manufacturers of *Slyver-Clad*® Industrial Batteries • PLASTICELL® and PLASTICAD® Batteries for Communications, Control and Auxiliary Power • Producers of *Autolay*® Silicon Chargers

*Trademark, C & D Batteries, Inc.
**Trademark, Industrial Nucleonics Corp., Columbus, Ohio

For more facts circle 572 on Reply Card

PLANT ENGINEERING
September, 1960

WHAT'S JUST AHEAD IN THIS ISSUE?

- UNDERSTANDING HOW to design and specify lighting installations can save money for you. Now, with just four easy lessons, you can make your own lighting layouts. To help plan your own lighting systems, you will want to read the first lesson, which starts on page 116.

- FIRES AREN'T GIVEN a chance to get out of control at Timken plants. Whatever fire-fighting equipment is needed for the job—and more—is always "at the ready" to take care of any small fire to see that it doesn't become a big one. To find out how Timken has organized its fire safety program, turn to page 120.

- ROOF DRAINAGE SYSTEMS of industrial buildings have often been as common a problem to plant engineers as the buildings themselves. Stainless steel, used in gutters, leaders and fittings, may offer relief for some of the problems you are having with your roof drains. The article beginning on page 124 tells how to design adequate drainage systems, and how to fabricate them in stainless.

- MAKEUP OF heated air to replace that used in process work in a plant takes engineering know-how if the job is to be done right. The article beginning on page 128 cites several cases in which makeup air had to be provided, and tells how each was engineered to do the job economically.

- WHEN MOTORS are exposed to water, chemicals, dust and dirt, the reliability of their performance depends on how well you have protected the windings against attack. Special enclosures, which cost a little more, can insure trouble-free operation. To learn just how much more these enclosures cost, turn to the article starting on page 132.

- WELL-PLANNED and well-run, a plant kitchen can insure better fed, more satisfied employees. Every kitchen is a design unto itself, but the fundamental philosophy of design is the same in all, and the certain basic equipment is necessary. To find out more about both design and equipment, turn to page 139.

- EVEN THE BEST regulated plants will have an occasional accident, so methods of accident prevention should be under constant scrutiny. "Using Photography To Analyze, Prevent Plant Accidents," which starts on page 146, gives suggestions on how to photograph plant accidents and how to use the pictures to help avoid future accidents.

Members of the Cleveland Chapter of the AIPE asked themselves this question: "How close are we to the 'ideal' plant engineer outlined in the 'Code of the Plant Engineer'?" Here is the answer they received from their 20 members

PLANT ENGINEERS CHECK ON THEMSELVES

By P. P. WEIDINGER, Plant Engineer, Bailey Meter Company, Cleveland, Ohio, (President, Cleveland Chapter) and
O. B. PATTON, Plant Engineer, Towmotor Corporation, Cleveland, Ohio (Vice President, Program Chairman, Cleveland Chapter)

ISSUANCE OF THE "Code of the Plant Engineer"* (PLANT ENGINEERING, October, 1959) provoked considerable debate among members of the Cleveland Chapter of the American Institute of Plant Engineers.

Since most individuals are intensely interested in themselves and a rating of their performance, a questionnaire was composed and distributed to the members of the Cleveland Chapter in an effort to determine how many of the members approached the "ideal" plant engineer. The findings are presented here to show how close they came.

Eighty questions were derived to test conformity to the Code's ideal Plant Engineer. To probe the degree of responsibility our members had in the manufacturing or industrial engineering areas, seven leading questions were inserted.

All 87 questions were answerable only by "yes" or "no", even if there was a strong desire to qualify the answer.

The activities questioned were to be considered and answered by the plant engineer on the basis that he and those responsible to him were one entity.

All participants were urged to report actual conditions without personal coloration. Since no signatures or identification were required, it was felt that the results were true and uninhibited.

All 20 members of the Cleveland Chapter completed their questionnaires and copies of the tabulated results were given the members at the subsequent meeting.

Over-all, the group complied with the Code's ideal Plant Engineer in 68 per cent of the activities questioned.

Degree of compliance to the ideal, by divisions of the Code, showed these variations:

1. Administration	68 per cent
2. Plant Layout	65 per cent
3. Plant Protection	49 per cent
4. Plant Utilities	71 per cent
5. Equipment Maintenance	79 per cent
6. Buildings and Grounds Maintenance	68 per cent
7. Relations with other departments	90 per cent

The seven questions relating to manufacturing engineering indicated the group had responsibility in 33 per cent of the areas questioned.

It is interesting to note that only three questions found all our members in concurrence with the ideal Plant Engineer. They did maintain liaison with other departments. They did act as management's agent in relations with contractors. They did have the authority to designate purchase of supplies and services from other than lowest bidders, where price was secondary.

1. Administration (21 Questions)

Survey indicates that most plant engineers keep records for their own use but only 50 per cent report effectiveness of their operation to management. Obviously, this is a disadvantage for the average plant engineer in his relations with management compared to other functions, that measure and monitor their effectiveness more readily. Some lack of aggressiveness can be visualized in this connection since no communication barriers are apparent.

One hundred per cent report maintaining direct lines of communications with all sections of the organization they serve. Some, unquestionably, are better administrators than others and the answers to the various questions in this section point to the fact that the man makes the job and not vice versa. Cost data, relating plant engineering to plant product output and projected budgets are prepared by half of the reporting group.

Strong control over contracted work relating to buildings, grounds and utilities is evident. Union-induced records are maintained by half of the respondents, but this fact is inconclusive since not all employers are union-organized and those

*Copies of the Code are available from Kay Buchanan, Acting Executive Secretary, American Institute of Plant Engineers, 4 West Northwest Highway, Arlington Heights, Illinois. Price: $1.00.

RESULTS OF SURVEY PRESENTED IN OPEN LETTER TO MEMBERS OF CLEVELAND CHAPTER

"Of the 87 questions to which the ideal Plant Engineer would answer 'yes,' you answered 'yes' 65.5 per cent of the time.

"The average number of plants for which you are responsible is 2.4. The largest number reported was five.

"The average of direct labor workers in your plant was 3100. High figure was 30,000, low was 200.

"The average of indirect workers in your plants was 1200. High figure was 10,000, low was 50.

"Office-based Plant Engineering personnel averaged 32 people, with a high of 300 and a low of one.

"Shop-based Plant Engineering personnel averaged 96; high was 300, low was six.

"Your average annual Plant Engineering budget (exclusive of contractor work) was $1,120,000. High figure was $4,000,000, low was $125,000.

"Annual value of contracted work averaged $300,000, with a high of 1½ million dollars, and a low of $2000.

The average plant area was 700,000 sq ft; high was 1,800,000 sq ft, low was 60,000 sq ft.

"Only half of you were able to report the annual gross sales volume of your company. This figure averaged $133,700,000, with a high at $850,000,000, and a low of $5,000,000.

"The averaged five-year expansion projected was for 240,000 sq ft, with a high of 350,000 sq ft and a low of 150,000 sq ft. Only five people ventured answers here."

O. B. Patton, Vice President,
Program Chairman Cleveland Chapter

that are organized only to varying degrees.

Close relation and exchange of information with management appears to vary widely in the plant engineering function. Reporting plant engineers present a cross section ranging from very large to small corporations. Only half reported sales volume and no more than 25 per cent could project future facilities requirements.

2. Plant Layout and Design (7 Questions)

Originally, this section contained 14 questions but for purposes of the survey was reduced to seven that relate directly to the Code. Extra questions were added to find out to what degree the plant engineer is responsible for all engineering except product engineering as suggested in the "General Principles" of the Code. However, in the balance of the Code, no reference is made to the detailed engineering activities allied with manufacturing processes.

Response to these additional questions ranged from 60 per cent indicating responsibility for tooling to 40 per cent for methods, down to 10 per cent for time study and product cost estimates.

Applicable questions, plus inference from additional questions point toward large incidence of remoteness from plant products and processes employed. Nevertheless, a large majority report designing and specifying construction of buildings and preparing plant layouts. It is difficult to understand how this can be accomplished without being more familiar with products, processes and equipment.

Only 35 per cent report maintaining real property records.

3. Plant Protection (14 Questions)

Results of survey indicate that in this locality, Plant Protection as outlined in the Code consists of two separate entities. Fire Protection and its attendant functions generally report to the plant engineer. Plant Security and liaison with law enforcement is usually supervised by the personnel department.

Eight questions pertained to Fire Protection. Majority showed close adherence to the Code except that only 35 per cent conduct fire evacuation drills. Less than one-third reported being responsible for Plant Security.

4. Plant Utilities (7 Questions)

In utilities operations our members are not totally self-dependent, due to the excellent technical services available from local utility companies. Instances requiring the plant engineer's participation were well covered and controlled.

5. Equipment Maintenance (9 Questions)

Equipment Maintenance, as might be expected, was well within the jurisdiction of the plant engineer. The exceptions were instances where specific equipment types were not in use by their respective companies.

6. Buildings and Grounds Maintenance (14 Questions)

Buildings and Grounds Maintenance reflected some organizational tendencies to place the grounds and yards responsibilities with material handling departments. Otherwise, the agreement with the Code was almost universal.

7. Relations With Other Departments (8 Questions)

The high rating in relations with other departments revealed that our plant engineers realized and accepted the fact that theirs was essentially a service function.

This ability to serve is perhaps a distinguishing characteristic of the plant engineer. His operations all point to continuity of services, utilities supply, high machine utilization, reduction of downtime, and the removal of any physical condition which would impede production. **End**

FIRST IN A SERIES

WILLARD ALLPHIN Tells . . .

How to Plan INDUSTRIAL LIGHTING

About The Author

Willard Allphin, Illumination Research, Sylvania Lighting Products, Salem, Massachusetts, is one of the top illuminating engineers in the country and author of the book "PRIMER OF LAMPS AND LIGHTING" oriented to the needs of plant engineers. A Fellow of the Illuminating Engineering Society, Mr. Allphin has published papers on industrial lighting, light and vision and conducted special researches on physiological cost of seeing. He is presently Chairman, Board of Fellows of the Illuminating Engineering Society and serves as a member on the Committee on Recommendation for Quality and Quantity of Interior Illumination and the School Lighting Committee. Also active in the Illuminating Engineering Research Institute, he serves as a member of the Technical Advisory Committee on Light and Vision and the Basic Research Advisory Committee.

A PLANT ENGINEER may want knowledge of industrial lighting for any of several reasons. He may want to help management decide whether a situation needs relighting —undoubtedly wanting to handle small problems without outside help. Such help is available when needed, however, from consulting engineering firms, electric companies, lamp manufacturers and fixture manufacturers.

Even when outside engineers are consulted, the plant engineer will benefit by a knowledge of the language and methods of industrial lighting. Also, this knowledge will help him to resolve any conflicts in recommendations which may occur.

These articles will not be a complete course in illuminating engineering. They will attempt to cover some of the basic principles of industrial lighting and to give some familiarity with the use of the lumen formula in lighting calculations. For example, the difference between a preheat and a rapid start fluorescent lamp will be described, but the internal circuit diagrams of the ballasts will not be given. Again, the various types of starters for preheat fluorescent lamps will be listed, but the internal operation of the starters will not be described.

For more detailed descriptions and explanations, in simple language, the reader is referred to the author's book, *Primer of Lamps and Lighting;* still more complete, at an engineering and scientific level, is the *IES Lighting Handbook*.

All lighting units are based on the response to radiation of the average human eye, Fig. 1. Note that the eye is most sensitive to light of a yellow-green color. However, this does not mean that we should use yellow-green lights in order to get greater "efficiency." The human eye evolved under daylighting, one kind of which is shown in Fig. 2. This type of curve is called a spectral energy distribution or S.E.D. curve and shows the relative energy of a light source at different wavelengths. The eye is accustomed to receiving light composed of all colors of the spectrum.

Note that there is radiation below a wavelength of 4000 angstroms. This is ultraviolet light. It really ought to be called "radiation" rather than "light" because, strictly speaking, light is the kind of radiation which can be seen by the human eye.

Likewise there is a radiation above a wavelength of 7000 angstroms called infrared radiation, or radiant heat. It, also, is invisible to the eye.

Intensity of any source in a particular direction is expressed in candlepower. In the case of a spotlight, beam candlepower is a measure of the intensity within the major part of the beam. Where lamps are rated in candlepower, such as 16 or 32 cp, we are referring to mean spherical candlepower. This is the average illumination intensity in all directions around the lamp.

A plant engineer is most likely to meet candlepower on the photometric distribution curves furnished by fixture manufacturers and based on measurements in their own or outside testing laboratories. Figure 3 might represent a particular fluorescent fixture, with candlepowers shown in two planes through the fixture, one parallel to the long dimension of the fixture and the other at right angles to it.

Strictly speaking, candlepower

measurements are only valid when the light comes from a point source, but it is agreed within the industry that fixtures will be considered as point sources in photometric laboratory work if the measurements are taken from far enough away so that the errors are small. In the case of fluorescent lamps, the measurement point is usually at a distance equal to five times the length of the fixture.

One must be careful in comparing photometric distribution curves not to judge total output or efficiency from the exact shapes of the curve. The way in which the curves are produced and the reasons why appearances can be deceptive are explained in *Primer of Lamps and Lighting*.

Amount of light produced by a lamp as visible energy is expressed in lumens. By definition, if the candle, Fig. 4, has an intensity of one candlepower in all directions and it is at the center of a sphere of one foot radius, the amount of light energy falling on one square foot of the inner surface of the sphere is one lumen.

Outputs of most lamps today are given in lumens, and lumen output describes the total energy radiated from the lamp in all directions.

Illumination on the inner surface of the sphere, Fig. 4, is, by definition, one footcandle. However, illumination is usually measured on flat surfaces, Fig. 5. The illumination on any surface is the number of lumens per square foot falling on the surface.

Unless otherwise specified, illumination in an interior is measured on a horizontal plane 30 inches above the floor. This is the height of a typical desk or table. On the other hand, many fine assembly tasks are performed at higher benches, and here the illumination is measured on the bench top. Also, a vertical surface may be more important than a horizontal one in some cases, so the illumination is measured on the vertical plane.

Brightness Measurement

Brightness of a surface is measured in footlamberts, whether the surface is emitting light or is reflecting it from another source. That is, the brightness of a fluorescent lamp, a diffusing plastic panel and a lighted wall would all be given in footlamberts. The basis of the unit is the number of lumens per square foot leaving the surface.

Note that both the footcandle and the footlambert involve lumens per square foot, the footcandle being lumens per square foot arriving at a surface, and the footlambert, lumens per square foot leaving a surface. In the case of reflected light, the two are related through the reflectance of the surface, sometimes called reflectivity or reflection factor. This tells what percentage of the light falling on a surface will be reflected away from it. Thus if the illumination is 80 footcandles on a surface having a reflectance of 20 per cent, the brightness of the surface will be 16 footlamberts. This is because 80 lumens per square foot are reaching the surface. It reflects 20 per cent of these, or 16 lumens. Since 16 lumens per square foot are leaving the surface, its brightness is 16 footlamberts.

Footlamberts will not be used in

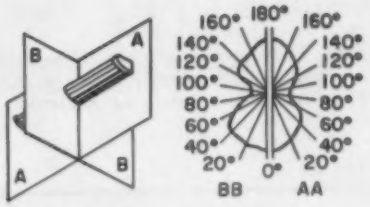


Fig.3. Candlepower distribution curves for a fluorescent fixture. Intensities are shown in two planes, one parallel to the long dimension of the fixture and the other across width of the fixture.

Fig. 1. Luminosity curve showing the relative response of the average human eye to light of various colors. Note that the eye is most sensitive to light of a yellow-green color.

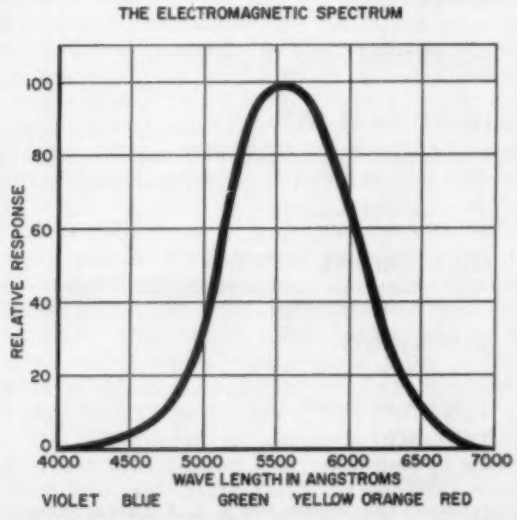


Fig. 2. Spectral energy distribution curve shows the relative energy of a light source at different wavelengths. In this case, daylight with a color temperature of 7400 degrees Kelvin.

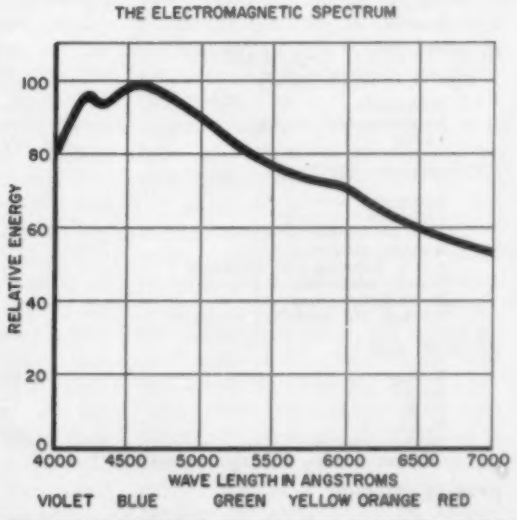


Table I. Partial list of currently recommended minimum illumination levels in footcandles for a wide variety of industrial tasks.

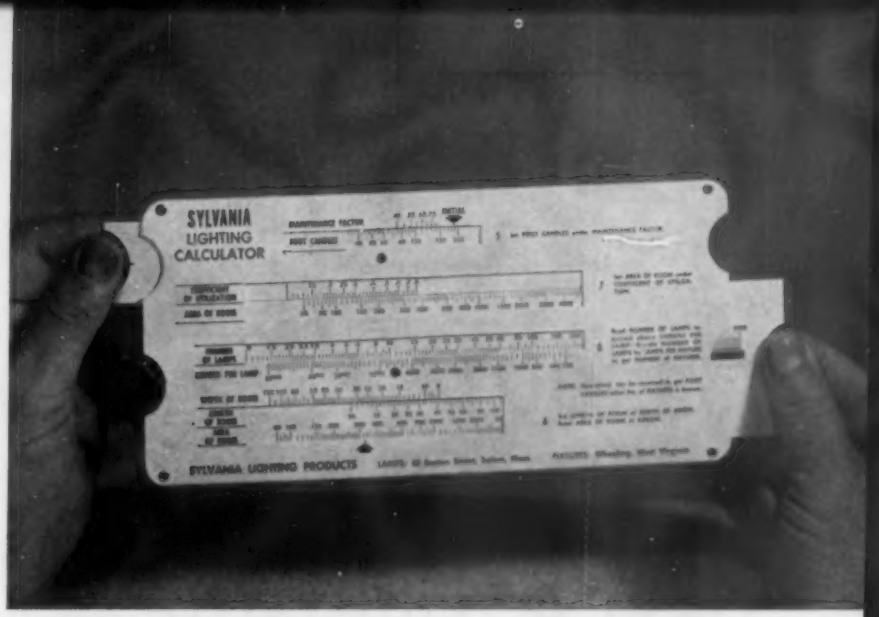
	Currently Recommended Illumination Footcandles
ASSEMBLY	
Rough easy seeing	30
Rough difficult seeing	50
Medium	100
Fine	500
Extra fine	1000
AUTOMOBILE MANUFACTURING	
Frame assembly	50
Chassis assembly line	100
Final assembly and inspection line	200
Body parts manufacturing	70
Body assembly	100
Finishing and inspecting	200
BAKERIES	
Mixing room	50
Fermentation room	30
Proofing room	30
Oven room	30
Scales and thermometers	50
Wrapping room	30
BOOKBINDING	
Folding, assembling, pasting, etc.	70
Cutting, punching, stitching	70
Embossing and inspection	200
BREWERIES	
Brew house	30
Boiling and keg washing	30
Filling (bottles, cans, kegs)	50
CHEMICAL WORKS	
Hand furnaces, boiling tanks, driers, etc.	30
Mechanical furnaces, generator and stills	30
Cooking tanks, percolators, nitrators	30
CLAY PRODUCTS AND CEMENTS	
Grinding, filter presses, kiln rooms	30
Molding, pressing, cleaning and trimming	30
Enameling	100
Color and glazing—rough work	100
Color and glazing—fine work	300
CLOTH PRODUCTS	
Cloth inspection	2000
Cutting	300
Sewing	500
Pressing	300
ELECTRICAL EQUIPMENT MANUFACTURING	
Impregnating	50
Insulating, coil winding	100
Testing	100
EXTERIOR AREAS	
Entrances—active	5.0
Entrances—inactive	1.0
Vital locations or structures	5.0
Building surrounds	5.0
Active shipping area surrounds	5.0
Storage areas—active	20
Storage areas—inactive	1.0
Loading and unloading platform	20
FLOUR MILLS	
Rolling	50
Sifting	50
Purifying	50
Packing	30
Product control	100
Cleaning screens, aisleways, walkways	30
FORGE SHOPS	50

	Currently Recommended Illumination Footcandles
FOUNDRIES	
Annealing furnace	30
Cleaning	30
Fine core making	100
Medium core making	50
Grinding and chipping	100
Fine inspection	500
Medium inspection	100
Medium moulding	100
Large moulding	50
Pouring	50
Sorting	50
Cupola	20
Shakeout	30
GLASS WORKS	
Mix and furnace rooms	30
Grinding, cutting glass to size	50
Fine grinding, polishing, beveling	100
Inspection, etching and decorating	200
INSPECTION	
Ordinary	50
Difficult	100
Highly difficult	200
Very difficult	500
Most difficult	1000
MACHINE SHOPS	
Rough bench and machine work	50
Medium bench and machine work, ordinary automatic machines, rough grinding, medium buffing and polishing	100
Fine bench and machine work, fine automatic machines, medium grinding, fine buffing and polishing	500
Extra fine bench and machine work, grinding	1000
MATERIALS HANDLING	
Wrapping, packing, labeling	50
Picking stock, classifying	30
Loading, trucking	20
Inside truck bodies and freight cars	10
PAINT MANUFACTURING	
General	30
Comparing mix and standards	200
PLATING	30
POLISHING AND BURNISHING	100
PRINTING PLANTS	
Color inspection and appraisal	200
Machine compositttion	100
Composing room	100
Presses	70
Imposing stones	150
Proofreading	150
SHEET METAL WORK	
Miscellaneous machines ordinary bench work	50
Tin plate inspection	200
SHIP YARDS	
General	5
Ways	10
Fabrication areas	30
TESTING	
General	50
Extra fine instruments	200

Abstracted by permission from I. E. S. Lighting Handbook, third edition.

Write In For Your Free Lighting Calculator

You will need this handy free lighting calculator when the author covers industrial plant and office lighting layouts in a later chapter. Write in now, so you will have it to work out the typical problems to be presented. Calculator is a simple tool for determining the number of fixtures required to meet a specification or the number of footcandles to be expected from a specific layout. It also provides a new and easy method for finding room ratios. Send your request, on company letterhead, to the Editor, Plant Engineering, 308 E. James Street, Barrington, Illinois. Remember, letterhead request only, please.



the calculations to follow, but it is well to know their meaning, because it is only by brightness that we see things. When a lighting engineer comes into a plant to study the lighting of a difficult assembly or inspection task, he is likely to use a brightness meter to measure the various brightnesses involved.

History of interior illumination has been one of continual increases in lighting levels as industrial and commercial needs intensified and as light sources became cheaper and more efficient. The booklet of recommended footcandles which accompanied a portable footcandle meter used 35 years ago suggests 8 footcandles for cotton spinning and weaving. Today the recommended level is 50 footcandles for spinning and 100 for weaving.

The values in Table I are based largely on the work of Dr. H. Richard Blackwell and his associates, as interpreted by technical committees of the Illuminating Engineering Society. It is not expected that the highest values will be used for general lighting systems. They can be reached with local lighting covering the immediate task area. On the other hand, our eyes accept still higher levels out of doors. Midday illumination in summer when the sun is shining is about 10,000 footcandles, and illumination in the shade of a tree or a building can run from 500 to 800 footcandles.

Lighting quality involves the distribution of light in the field of view and the degree of freedom from glare. Illumination from a few small sources produces deep shadows which not only make the appearance of a room displeasing, but can be a cause of accidents. At the other extreme, a room lighted to complete uniformity from all directions would be undesirable. Objects would lose their three-dimensional appearance, and the condition called "arctic whiteout" would be approached.

On the negative side, lack of quality is most often indicated by glare. Glare can be divided into three types: distraction glare, discomfort glare and disability glare. Distraction glare tends to pull the eyes toward the source when they should be directed toward the task.

Discomfort glare, as the name implies, is uncomfortable or annoying. People differ tremendously in their discomfort glare reactions. One person may find a source of 100 footlamberts annoying in a particular situation. Another person may accept 1000 footlamberts in the same situation without conscious annoyance. Our best approach is to design lighting systems such that most of a group of people will be comfortable.

Disability glare reduces the ability to see the task, or, stating it more completely, it reduces visual performance. Unlike discomfort glare, which exists mostly in the mind, disability glare can be measured, and devices for doing this will eventually be available.

So much for these basic considerations. Actually, the engineer is usually on safe ground when using the fixtures of a reputable manufacturer in applications for which they were designed. **End Part I**

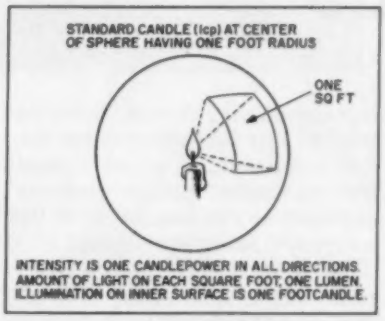

STANDARD CANDLE (lcp) AT CENTER
OF SPHERE HAVING ONE FOOT RADIUS
ONE
SQ FT
INTENSITY IS ONE CANDLEPOWER IN ALL DIRECTIONS.
AMOUNT OF LIGHT ON EACH SQUARE FOOT ONE LUMEN.
ILLUMINATION ON INNER SURFACE IS ONE FOOTCANDLE.

Fig. 4. Amount of visible light energy falling on one square foot of the inner surface of the sphere is one lumen.

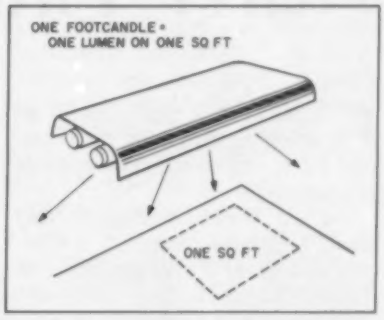


Fig. 5. Illumination is usually measured on a flat surface. One footcandle equals one lumen on one square foot.

ALL-OUT FIRE SAFETY PROGRAM HELPS TIMKEN FIGHT FIRES

IF A SERIOUS plant fire is an accident of bad luck, is a fire-free safety record merely the result of good luck?

No. At least according to Ray Strub, Supervisor, Safety, Fire Control and Plant Protection for The Timken Roller Bearing Company. The company has been able to avoid any serious fire losses during the last 10 years.

Strub, a safety administrator of 27 years' experience, looks upon the Timken Company's enviable fire-free record as the logical reward earned by following four good-management practices:

1. Continuing fire-safety education programs for all employees
2. Careful study and analysis of all potential fire risks
3. Intelligent selection of proper protective equipment
4. Comprehensive training of a professional fire protection force.

Like other safety directors, he believes that the first step in fire protection is to eliminate or minimize the possible causes of fire. This means good housekeeping, proper storage of flammable substances and maintaining of productive equipment in proper operating condition. It means education, too—patient, thorough instruction of employees in the careful use of matches, welding equipment, cutting torches, and other fire-producing devices. Believing that the best kind of fire is the one that never starts, it is only natural that prevention through employee education is the foundation of the company's fire-safety program.

But if fire does occur, as it sometimes will in spite of all, then according to Strub, the crucial job is to get at the fire and kill it quickly, while it is still small—before it gets big enough to get out of hand and do serious damage. For this you need a "heads up" fire fighting organization—competent, alert and fully equipped to handle any emergency.

More Than Enough Equipment

"We analyze each plant area and operation," says Strub, "in terms of possible fire hazard. Then we protect these areas with the necessary on-the-spot fire-fighting equipment. We never settle for merely adequate protection, but insist on having overwhelming fire-fighting power instantly available at all danger points. Our kind of all-out fire safety program calls for a large amount of special fire-fighting equipment for localized protection, on the theory that if we can't prevent a fire we can contain it.

"In one place, foam generators are necessary; in another, portable fire extinguishers may be specified. We use whatever equipment is best fitted to do the job."

While fire-protection methods vary according to local conditions among the 10 Timken plants in the United States and Canada, the fire-protection equipment installations and fire-safety organization at the headquarters bearing plants in Canton and tube plant at Gambrinus are representative of the group.

At the Canton plants the company uses some 70 overhead automatic sprinkler systems to provide water at all points. Sprinklers are connected to Gamewell alarm systems and when actuated send an alarm into the central station desk in Plant Protection Headquarters, indicating the location where a water flow is occurring. Additionally, 100-ft reels of 1½-in. fire hose are located in all departments. These hoses are so placed that they will cover and overlap the areas they are intended to protect.

Since large quantities of oil and other flammable materials and many electric motors are essential in manufacturing, portable carbon dioxide and foam fire extinguishers and foam generators are spotted at strategic locations throughout the plant. These extinguishers play an important role in keeping small fires from getting out of control.

Members of the company's volunteer fire brigade spray water through a 2½-in. nozzle during one of the frequent practice drills. In the background is one of the many hose houses located throughout the plant.

If a paint, oil or electrical fire occurs in a localized area, perhaps in a storeroom, machine or motor, a few seconds of work with a portable extinguisher will usually dispatch the fire before it gets big enough to cause any damage or trigger the automatic water sprinkler system.

Sometimes the nature of a particular operation calls for out-of-the-ordinary protective measures. In such cases the company calls in specialists to study the problem and make safety recommendations. The heat-treating operation is an example.

In heat-treating, as much as 40,000 to 60,000 gallons of flammable oil is used for quenching hot metal. Clearly this is an operation where portable extinguishers, fire hoses or overhead sprinklers would not provide enough of the right kind of fire-fighting ammunition. Engineers from American LaFrance studied the heat-treating operations and then designed tailor-made protection systems.

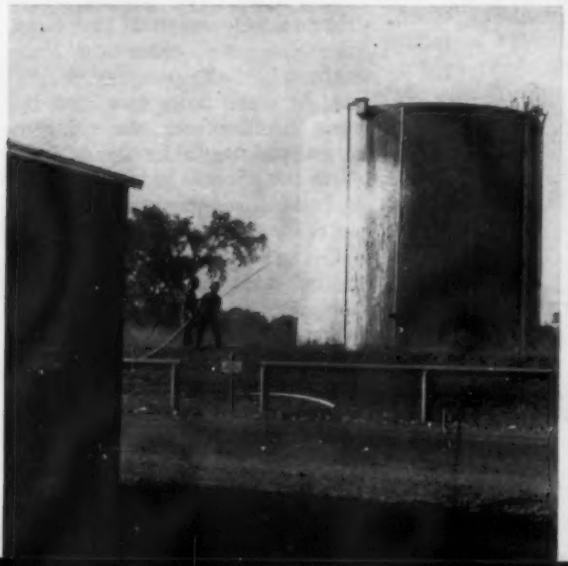
Built in as a permanent part of the heat-treating equipment, the systems are set to go into action automatically and envelope the entire area in a smothering cloud of carbon dioxide gas at the first sign of fire. Other built-in systems, either manually or automatically actuated, protect the paint spray booths, washers and slushers.

Timken has installed remote emergency control boxes in all departments where gas is used. There may be one, or as many as four boxes in a department, depending on its size. Should fire or explosion occur, the gas supply to the entire department can be shut off in a matter of seconds, simply by pulling any one of the boxes. The boxes are so designed that they do not reset automatically; they must be reset and resealed manually.

The Gambrinus tube plant has an automatically actuated water pump capable of delivering 1500 gpm at a pressure of 150 psi. The pump supplies water to a piping system, consisting of eight and ten inch lines, which completely encircle the entire plant. All hydrants on the line are painted with fluorescent paint for maximum visibility.

In addition to the fixed and port-

Each fuel tank has a foam house located a safe distance away. The fuel tanks are also surrounded by earthen dikes.



Interior view of a hose house shows equipment used and how it is stored. Inspector is checking a foam generator.

These two rows of carbon dioxide bottles stand guard, ready to go into action, automatically, in case of a fire.

In a demonstration of its effectiveness, a fixed carbon dioxide system discharges over the machine it protects.

FIRE SAFETY PROGRAM AT TIMKEN

able fire-fighting equipment, the 400-acre Canton and Gambrinus properties have the added protection of their own fully-equipped fire engine. This American LaFrance pumper, built on a Ford chassis, is completely fitted with two-way radio, emergency generator, portable floodlights, air packs, and oxygen outfits, plus a full complement of hose and booster lines. The truck also carries liquid foam for smothering flammable liquid fires.

The company's fire department is under the immediate direction and supervision of Fire Captain Vernon Price, an employee for 18 years who studied fire protection methods at Purdue and Ohio State University and at the American LaFrance fire protection school in Elmira, New York.

At the Canton plants, Price heads an organization of 15 full-time professional firemen, especially trained for their jobs by a former fire chief of the Canton Fire Department. Working on a three-shift basis, five firemen are assigned to the fire truck on each shift.

Backstopping the 15 full-time firemen is a force of 300 volunteers, each of whom has the benefit of a 30-hour training course approved by the state of Ohio. All volunteers receive the same training as the members of Canton's municipal fire department. Each volunteer fireman has a specific assignment to fulfill when the plant fire alarm system rings. Volunteer firemen receive refresher courses through weekly drills, and all are supplied with personal copies of the company's 70-page Fire Prevention Manual.

When vacancies occur, Price prefers to fill them with men from the company's maintenance departments. Price's reasoning: (1) maintenance men know the plants better than other employees because their work gets them into practically all departments. (2) maintenance crews are on duty around the clock, providing 24-hour volunteer fire coverage.

Captain Price's men are responsible for training the supervisors of all departments in the correct use of fire extinguishers as "first-aid" treatment against incipient fires.

All burning and welding operations are supervised by a full-time safety inspector, who stays with the job until it is completed.

The final line in the company's fire defense is, of course, the Canton Municipal Fire Department, instantly available on emergency call. To keep the city's firemen up to date on developments at the plants, Price arranges for them to take annual tours of the company properties. At these times new men become familiar with the company layout and the older hands learn about any possible changes in either the plant or equipment effected during the year.

Over the past six years Timken has invested more than $1,500,000 in modern fire-protection equipment in support of its continuing conviction that in fire protection the best defense is overwhelming offensive power. **End**

Fire inspector checks the equipment in an extinguisher station. It is one of many located throughout plants.

TV "DELIVERS" BLUEPRINTS— DETAILS COME BY INTERCOM

Left: Engineer explains a detail in the drawing to the manufacturing assembly foreman in another part of the building. Camera at top of photo is focused on the drawing on table. Picture is displayed on the plant's monitors, including the monitor beside the engineer.

Below: The manufacturing assembly foreman listens to the engineer's explanation of the detail in the drawing as he views drawing on TV monitor and refers to equipment at his side.

ONE OF THE products at General Electric's Technical Products Operation at Lynchburg, Va., has been put to work to provide a speedier, more efficient and less costly blueprint distribution system.

An Intra-Tel closed circuit television camera—manufactured by the operation here—is the key in the unusual setup. The camera is installed in the blueprint distribution center and is trained on a display board. The tracings are filed close by.

This camera is connected to 12-in. TV monitors throughout the plant—drafting-engineering, assembly floor and assembly planning.

Each monitor is equipped with pan, tilt, and zoom lens controls to operate the camera remotely, allowing personnel to get closeup views of any part of the tracing.

An intercom system at each viewing station provides instant two-way communications with the file room for discussion regarding any tracing.

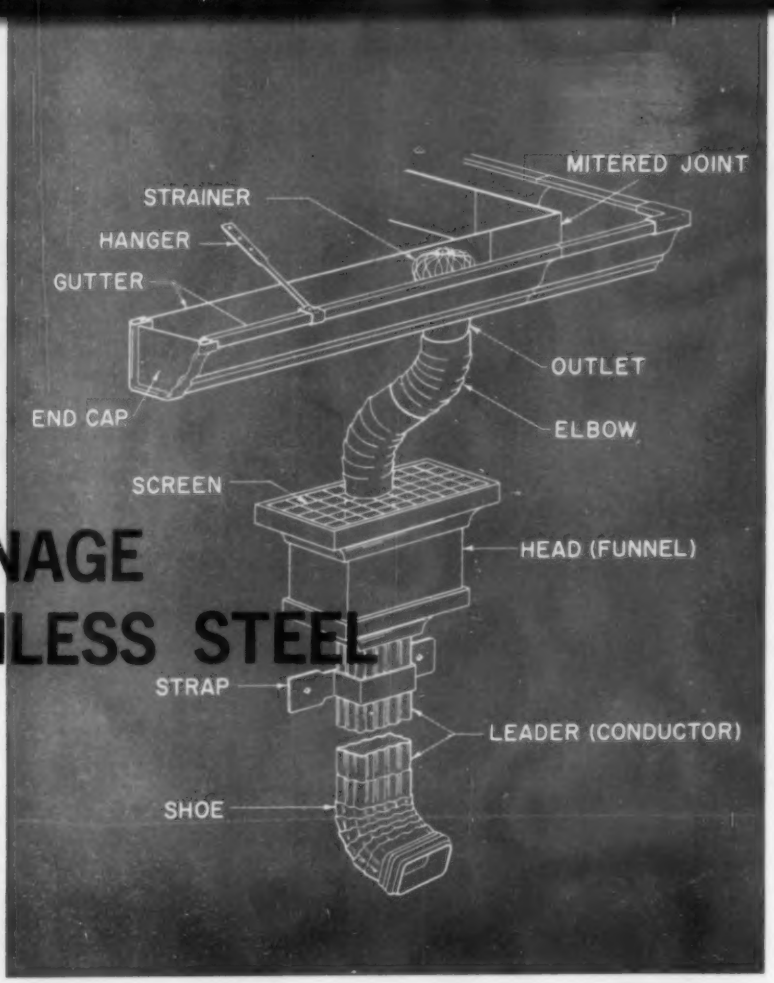
Through this system, a section wanting to work with a particular sketch can see it almost instantaneously. The delays and costs involved in making blueprints and delivering them are eliminated.

In addition to making information available much faster, the system offers a guarantee that up-to-date information will be in use at all times. When it was necessary to maintain large files of blueprints, there was the danger that copies not showing latest revisions would be used.

The closed circuit system also accomplishes a savings in cost—less blueprint reproduction and release of clerks for more productive effort.

In addition, separate similar systems can be used between groups which discuss drawings constantly.

At Technical Products Operation, such a system is set up between drafting and the pre-production shop. This visual and audio communications setup works independently of the normal blueprint distribution system. **End**



ROOF DRAINAGE IN STAINLESS STEEL

How To

1. Design it

2. Fabricate it

STAINLESS STEEL was originally used for residential roof drainage systems, but in recent years it has found application in new and replacement systems on industrial plant buildings. This article will show how drainage systems are designed, and how stainless steel can be used to fabricate the components of each design.

Design of roof drainage systems depends primarily on the quantity of water to be handled. This, in turn, depends upon intensity and duration of average rainfall in a particular locality and the area of the roof to be drained. Standard practice is to design roof drainage to handle the largest storm that might be expected in an area during an average 10-year period.

Leaders—Four-inch round, square or rectangular leaders are commonly used, but larger sizes can be shop-fabricated by sheet metal contractors. They should be near the building corners so water won't have to flow far after a sharp turn. Long leader drops should have heads every 40 ft to admit air, preventing a vacuum.

How Many Leaders?

Here's how to compute leader size needed:

1. Check the map that appears on the next page. It will indicate the approximate area drained, in square feet, per square inch of leader area, for a 10-year maximum intensity storm in your locality.

2. Divide the figure taken from the map into the square footage of the roof area to be drained; use the actual roof area, not its projected area on the horizontal. The result is the total number of square inches of leader area required.

3. Then, consult the table of leader areas to determine the size and number of leaders needed.

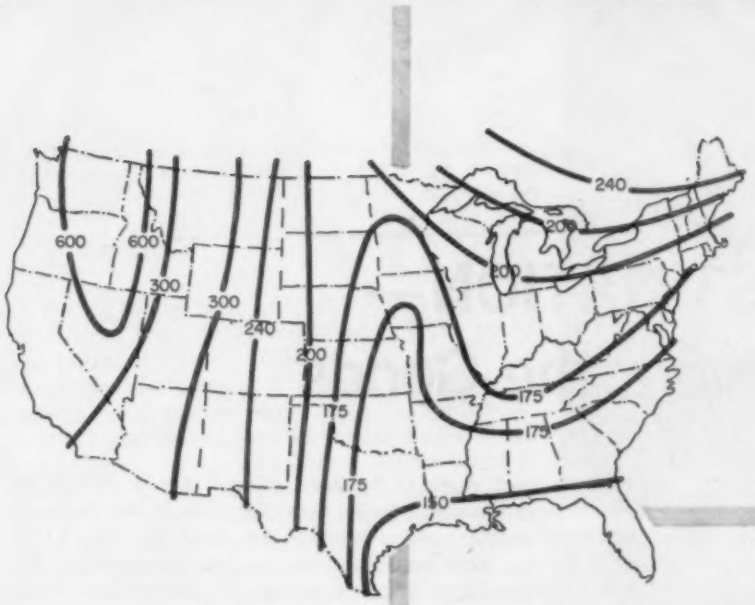
Gutters—For spacing up to 50 ft, gutters should be the same size as leaders; 1 in. larger than the leaders in spacing from 50 up to 70 ft; 2 in. larger up to 90 ft.

Gutter slope should be about 1/16 in. per foot for efficient drainage. If appearance is important it can be installed "dead level." Expansion joints should be placed midway between outlets when needed.

Some plants have their own sheet metal shops. Where gutters, conductors and other parts are to be plant-fabricated from stainless steel, the following instructions will prove useful.

Forming—Regular sheet metal shop equipment can be used. However, care should be taken not to walk on or mar the surface of the stainless during fabrication and erection.

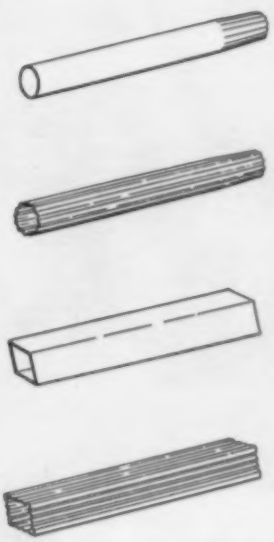
Riveting—Chromium-nickel stain-



Lines on map indicate roof area drained per square inch of leader.

Table shows area of various sizes and shapes of standard leader.

Types of Standard Leaders	Sizes in Inches		Area in Sq In.
Plain Round	3		7.1
	4		12.6
	5		19.6
	6		28.3
Corrugated Round	3		5.9
	4		11.0
	5		17.7
	6		25.9
Plain Rectangular	1¾ x 2¼		3.9
	2 x 3		6.0
	2 x 4		8.0
	3 x 4		12.0
	4 x 5		20.0
	4 x 6		24.0
Corrugated Rectangular	1¾ x 2¼	(2)	3.8
	2⅜ x 3¼	(3)	7.7
	2¾ x 4¼	(4)	11.7
	3¾ x 5	(5)	18.8



less steel rivets up to ¼ in. in diameter can be driven cold. Since they are tough, and work-harden rapidly, heads should be completely formed with a few heavy blows—not a patter of light blows.

All accessories should be of stainless steel. Hangers, hooks, circles, shanks and other accessories are available in stainless. Always use stainless steel nails, rivets, screws, cleats and bolts. Other materials will stain the system.

Soldering—The soldering operation is similar to that for regular steel. 70/30 solder (70 per cent tin —30 per cent lead) is preferred, but 50/50 solder, or a commercial stainless steel solder, will do the job.

Cleaning—Flux etches the stainless surface for soldering. If it is not removed, etching action continues, causing superficial rusting. Residual flux chlorides may also cause unsightly rust.

Thorough hosing and scrubbing with plenty of clear water, immediately after soldering, is most important to remove the flux. If superficial rusting due to non-removed flux should occur, do this:

1. Wash with plenty of clean water to remove chlorides;
2. Swab on a phosphoric acid-containing stainless steel cleaner, letting it remain ½ hour or more;
3. When rust disappears, rinse with clean water.

Objectionable oily stains, fingerprints or grease may be removed by scrubbing with ordinary detergent.

Painting—On rare occasions when painting may be desired, stainless steel will take and hold paint well.

Stainless steel for industrial roof drainage systems may be specified this way:

"All sheet metal for roof drainage applications shall be 0.015 in. 17-7 Stainless Steel (Type 301), Cold-Rolled Strip, No. 1 Finish, Soft Temper. Remove all soldering flux immediately with clear water." **End**

DIAL ITS DESTINATION—
Conveyor Delivers the Goods

AS A SOLUTION to the problem of an awkward physical setup for handling incoming merchandise, Famous-Barr of St. Louis, Missouri has installed in its downtown store one of the first electronically controlled monorail systems to be used by a department store.

Merchandise is received in a service building located a block north of the store. It must then be sent to the store through a tunnel extending through the basement of another service building and under the street to the store. This procedure has in the past created real difficulties in handling masses of merchandise during peak seasons.

The new conveyor system, designed and built by Columbus-McKinnon Chain Corp., Tonawanda, N.Y., carries merchandise for the basement and first floor departments from the second floor of the service building, down a special lifting conveyor track through the connecting tunnel to the store, and then up another conveyor track to a block-sized loop through balcony level stockrooms and back to the receiving building.

There are 150 carriers available for hauling stock, and during a normal working day there are about 30 to 40 moving along the track each hour. The carriers

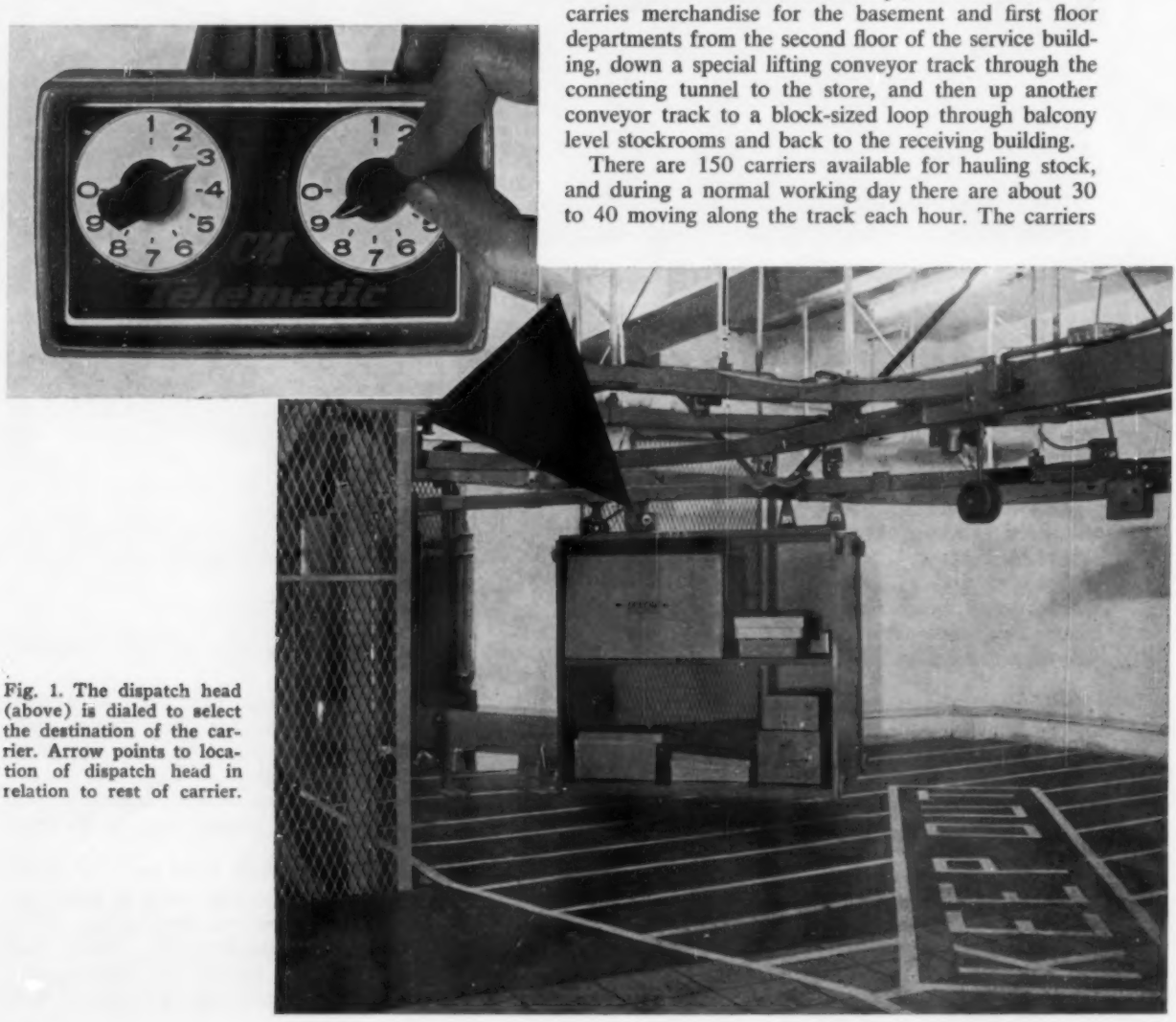


Fig. 1. The dispatch head (above) is dialed to select the destination of the carrier. Arrow points to location of dispatch head in relation to rest of carrier.

Fig. 2. Beginning of receiving operation in service building. After being checked merchandise is placed on carrier.

are 4 ft long, 40 in. high, 30 in. deep, and will carry up to 300 lb. They are moved along at a rate of 30 fpm by means of a power chain.

As merchandise is received at the loading dock of the service building, it is placed on a flat roller conveyor which can be fed from any point on the dock, and then carried to the second floor of the building by means of a pusher bar conveyor. As the packages ascend to the second floor, they are tagged by the receiving clerk with a receiving record. Boxes move on a conveyor until a dispatcher flips a switch which swings a deflecting bar across the belt, diverting the package at the proper point so that it slides down a pipe incline which lands it at the correct checking point.

Here the merchandise checker opens the carton, checks its contents, and loads them into one of the monorail carriers. Free rail loops are in back of each checker so that carriers can be removed from the power line as needed.

Checker Sets Dial—Carrier Takes Over

When the carrier is loaded, the checker sets the dial on it for the proper ultimate stockroom destination and pushes the carrier onto the power rail. The dial contains 10 numbers corresponding to stockroom areas in the store. With just this one setting, the carrier, with its own dispatch head, guides itself to the proper stock area in the store.

Cars go first to a marking room, where this process is completed. After marking, the supervisor checks the dial to make sure it is set for the proper receiving point, and pushes the carrier to an automatic pickup point where the carrier is moved down a shaft to the basement of the service building.

Lifting tracks are located in pairs at each end of the tunnel. Each lift is designed to move carriers in one vertical direction only. The carriers roll onto a short piece of track in a lift and trip a switch activating the lift. If a lift is busy, switches stop the carriers until the lift returns.

At the basement level the carriers cross the tunnel and proceed to the store. Several safety devices are provided at the crossing point to eliminate traffic accidents, including a "stop and go" light and a warning signal operated by an electric eye. Momentary obstructions are disregarded. However, if an obstruction remains, the power is shut off and the carriers cannot be taken across the tunnel until the obstacle is removed and the starting button reset.

At the store end of the tunnel, carriers are diverted by means of transistorized decoding stations either to the basement stock area or onto the automatic lift that takes the carrier to the first floor balcony.

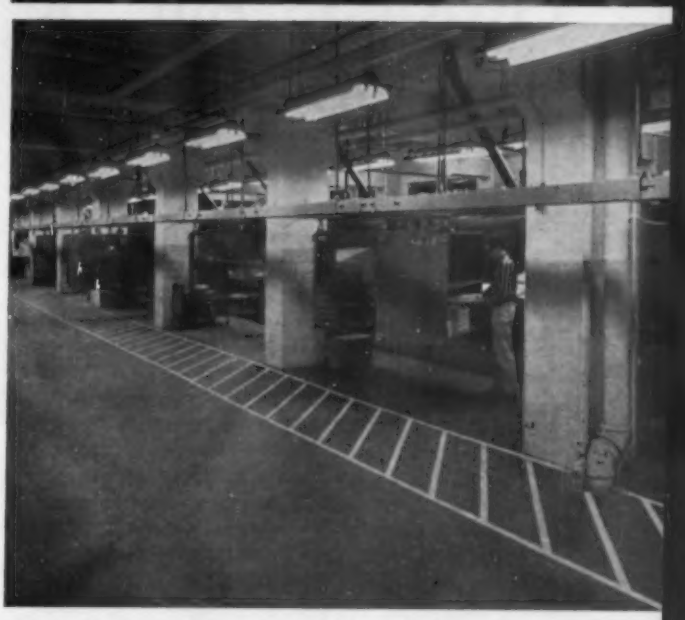


Fig. 3. Above: When carrier is filled, checker dials room destination on Telematic dispatching head and pushes carrier onto power rail for transfer to marking room.

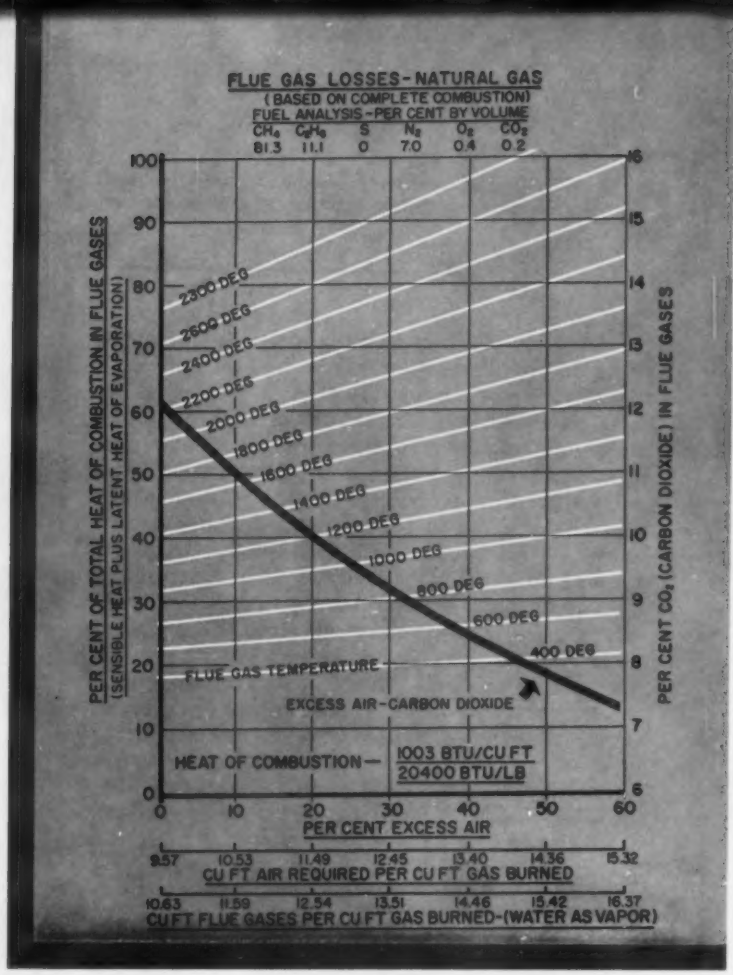
Arriving on the balcony level, the carrier automatically is directed to the correct one of seven stock areas enclosed in monorail loops and grouped around the central power line. If a loop is completely filled with carriers, the control station governing the track switch will recirculate the carrier to its designated stock loop for unloading.

This process continues until the carrier is admitted to the proper loop or siding, where it is unloaded and the stock placed on shelves. The unloaded carriers are pushed back onto the main track by hand. Remotely controlled switches on the power rail automatically return the carrier to the receiving building.

Stock areas are located as nearly as possible above the departments they serve. To speed merchandise to the selling floor, four-shelf truck lifts, resembling electrically operated dumb-waiters, have been spaced around the balcony for conveying merchandise to the first floor. **End**

PROCESS AIR MAKEUP CALLS FOR KNOW-HOW

By JOHN B. HARJU, P.E.,
John B. Harju and Associates
Ferndale, Michigan


FLUE GAS LOSSES - NATURAL GAS
(BASED ON COMPLETE COMBUSTION)
FUEL ANALYSIS - PER CENT BY VOLUME
CH4 C2H6 S N2 O2 CO2
81.3 11.1 0 7.0 0.4 0.2
PER CENT OF TOTAL HEAT OF COMBUSTION IN FLUE GASES (SENSIBLE HEAT PLUS LATENT HEAT OF EVAPORATION)
PER CENT CO2 (CARBON DIOXIDE) IN FLUE GASES
2300 DEG
2600 DEG
2400 DEG
2200 DEG
2000 DEG
1800 DEG
1600 DEG
1400 DEG
1200 DEG
1000 DEG
800 DEG
600 DEG
400 DEG
FLUE GAS TEMPERATURE
EXCESS AIR - CARBON DIOXIDE
HEAT OF COMBUSTION — 1003 BTU/CU FT
20400 BTU/LB
PER CENT EXCESS AIR
9.57 10.53 11.49 12.45 13.40 14.36 15.32
CU FT AIR REQUIRED PER CU FT GAS BURNED
10.63 11.59 12.54 13.51 14.46 15.42 16.37
CU FT FLUE GASES PER CU FT GAS BURNED - (WATER AS VAPOR)

MANUFACTURING PLANTS have processes which require the exhausting of air from buildings. This exhausting of air requires that it be replaced with fresh outside air. During certain seasons such fresh air additions must be heated and this article discusses that phase of process air makeup pertaining to the normal heating season.

Costs incurred in the handling and heating of process air makeup are chargeable to the processes which make such air replacement necessary provided that such air is not heated above the normal space heating temperatures maintained within the plant. It can be readily seen that any incoming fresh air which is heated above the normal space heating temperatures maintained within the plant, will act as a heat radiating medium—satisfying the various radiation heat losses of the building—just as a hot radiator gives off heat to the surrounding lower temperature air.

Gas Utilities and their representatives come into daily contact with industrial process air makeup problems. The usual question which they ask an industrial customer contemplating the use of gas fuel for process air makeup purposes is, "How much gas per hour will you require for this new load?" This stems from the fact that the question of adequate supply and metering facilities is of primary concern to gas utilities. In the case of larger manufacturers, such questions are usually answered by their plant engineering departments. Smaller plants may depend on various sources for information.

It must be borne in mind, however, that a plant survey to determine proper process air makeup requirements is not a simple act of tabulating exhaust quantities from equipment and machinery nameplates. It can be, depending upon the complexity of the plant operations, a complex problem requiring considerable engineering and manufacturing know-how.

When gas fuel is available only for processing purposes, it is important that the utility's representative determine whether the customer has another fuel source to satisfy the space heating requirements of his plant.

Operation of gas burning equipment within a plant which is not properly supplied with process air is not efficient and tends to create conditions which could be hazardous to the plant property and to its occupants as well. Most gas utilities are often confronted with industrial customer complaints which are due to buildings being operated under vacuum conditions.

Many manufacturers might well be more cognizant of the relative requirements of their space heating and process air heating loads. A survey of such loads could well point to the desirability of installing separate heating systems to supply each of these loads with resulting benefits.

Case I. To illustrate this, consider the case of a manufacturer who commissioned a consulting engineer to make a survey of his process and plant space heating loads and then to expedite the planning of separate

heating systems to furnish these needs representing the engineer's recommendations after his initial survey. Losses in the case appear in the table below.

Consulting engineer's solution of this client's problem called for the installation of an oil-fired, low-pressure boiler with 298 sq ft of heating surface for satisfying the space heating requirements of the plant, gas being available only for process usages. The process air makeup system entailed the use of four 25,000 cfm

Heat Losses (0 to 70F)

a. Radiation Losses—Bldg.	2,000,000 Btu per hr
b. Process Air Makeup (100,000 cfm)	7,500,000 Btu per hr
Total Process and Space Heating Load	9,500,000 Btu per hr

gas-fired heating units furnishing 100 per cent outside fresh air to the plant. In this particular case, some of the obvious benefits which this plant enjoyed as a result of providing two separate heating systems in accordance to the consulting engineer's recommendations and plans are:

1. Elimination of boiler operators on all three shifts during the heating season. (Boilers with 300 sq ft or more of heating surface require boiler operator attendance in the plant location concerned.)
2. Simplified accounting procedures in the distribution of process and building fuel costs.
3. Provided a more flexible heating system which resulted in lower over-all fuel costs. The process air makeup equipment is not in use when production operations are idle.
4. System as designed permits the use of air makeup equipment for supplying fresh air to the plant in the summer months for ventilating purposes.

Determination of process air makeup requirements for any manufacturing plant, as previously indicated, is not a simple problem. Without trying to cover all the different kinds and types of processing equipment and machinery requiring exhausting and replacement of air in various manufacturing operations, some of the engineering fundamentals are explained as they pertain to the processes shown in the accompanying illustrations.

Case II. Washer shown in Fig. 1 is a three-stage unit employing gas-fired immersion burners for heating the solution in the storage tanks of each stage. The flue gases from these burners are collected by a common duct and exhausted to the outside atmosphere by means of an induced draft fan located on the top of the washer. Total natural gas input to all three burner systems is 5000 cu ft per hr.

You will note that the conveyor enters the washer through an opening on one end of the unit. It leaves

Replacement Volume Due to Washer

a. Immersion Burner Combustion Air Estimate 40 per cent Excess Air (Curve 1)	1200 cfm
b. Inlet Opening Air Flow 17.5 sq ft x 150 fpm	2625 cfm
c. Outlet Opening Air Flow 17.5 sq ft x 150 fpm	2625 cfm
Total Replacement Air Required	6450 cfm

via a similar opening at the other end. Note also the exhaust duct protruding from the top of the washer near the inlet opening. Fan in this duct keeps a constant

Fig. 1. Gas-fired immersion burners are used in washer at the right. Flue gases are exhausted via common duct.

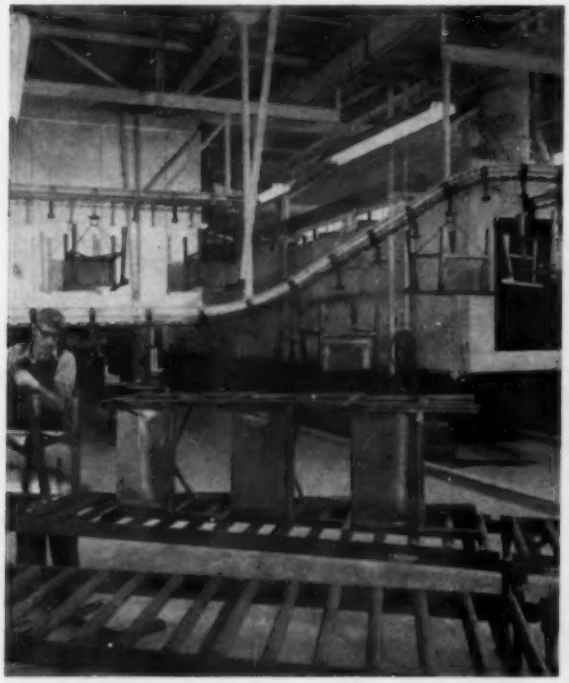


Fig. 2. Heat treat furnace equipped with radiant tube gas burners. Flue gas temperature is cut about 1300 F.

flow of air through the inlet opening and into the washer and finally to the outside atmosphere.

This flow of air keeps any steam or other vapors formed inside the washer from entering the plant. The velocity of this air stream is usually about 150 fpm, across the opening area.

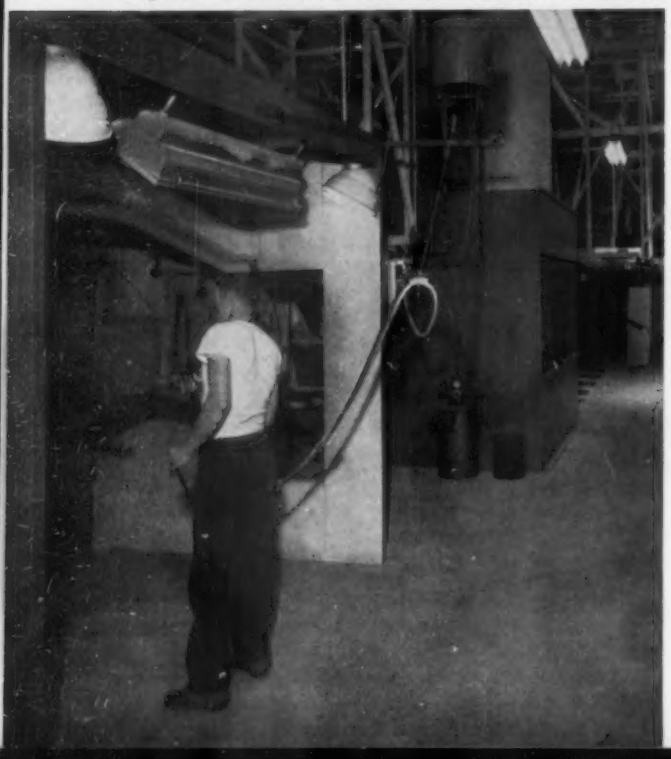
The furnishing of 6450 cfm of process air makeup in this case is chargeable to the washer and costs $0.56 per hr or $368.00 per heating season based on an eight hr, six day per week operation. (Figures are based on an average heating season for lower Michigan with natural gas costing 85 cents per 1000 cu ft).

Case III. Figure 2 shows an inert atmosphere, gas-fired carburizing heat treat furnace which employs radiant tube burners and is installed in a large automobile parts manufacturing plant. The normal operating temperature of this furnace is 1700 F and when operating at this temperature will emit flue gases at approximately 1800 F. In order to conduct these flue gases to the outside atmosphere without reverting to the use of a firebrick-lined exhaust stack, sufficient plant air is mixed with same so that the resultant flue gas and air mixture is exhausted at approximately 500 F. The maximum gas input of this furnace is 3640 cu ft per hr of 1000 Btu/cu ft natural gas.

Replacement Volume Due to Furnace

a. Radiant Tube Combustion Air (Curve 1) (Estimate 10 per cent Excess Air)	640 cfm
b. Air for Temperature Reduction of Flue Gases	
$\frac{\text{Sensible Heat—Sensible Heat (1800 F)} \quad \text{(500 F)}}{1.08 \times (500\text{-}70)}$ / 70 per cent eff.	3900 cfm
Total Replacement Air Required	4540 cfm

Fig. 3. Air exhausting through paint spray booth enters into the picture of calculating over-all plant process air makeup.



It is to be noted that the process air makeup quantities shown for the particular heat treat furnace discussed herein are nowhere near adequate to provide comfort ventilation during the summer months. Supplying of proper quantities of makeup air for heat treat areas is very essential in that vacuum conditions will tend to reverse the flow pattern of flue gases thus creating health and safety hazards as well as increasing fuel costs of such equipment.

Case IV. The paint spray booths in Fig. 3 are of the dry type with conveyor lines passing through them. The approximate dimensions of face openings of these booths are 9 ft 8 in. wide by 8 ft high and the inlet and outlet vestibule openings are 3 ft 6 in. wide by 5 ft high. The exhaust fans for each booth have a capacity of 13,000 cfm.

Exhausting of plant air via paint spray booths again necessitates the replacement of plant air with process air makeup systems. The cost of furnishing 13,000 cfm for each booth amounts to $1.12 per hr or $742.00 per heating season based on an eight-hour, six-day per week operation with natural gas costing 85 cents per 1000 cu ft.

Gas-fired process air makeup equipment available on the market today is of the following two types:

1. Indirect Fired. In these heaters the outside air being heated and then emitted into the plant does not come into direct contact with the combustion process and the resultant flue gases—the latter being exhausted to the outside atmosphere. The efficiency of this type is approximately 80 per cent.

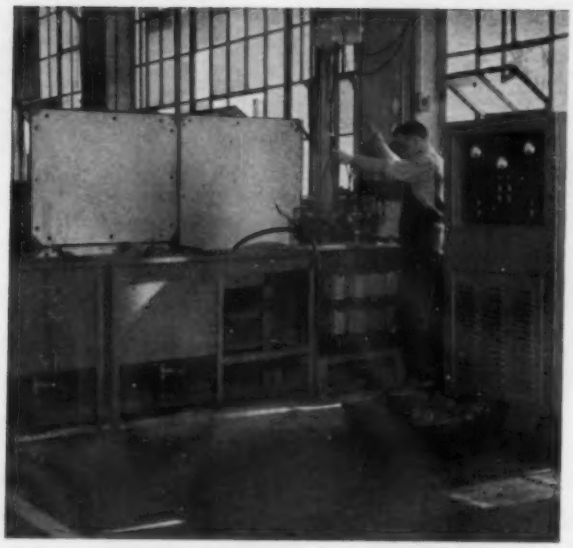
2. Direct Fired. In these heaters combustion takes place in the stream of outside air being heated and the resultant flue gases are emitted into the plant along with the outside air being heated. The efficiency of this type is approximately 90 per cent and not 100 per cent as generally considered, because the heat of evaporation of any water formed by the combustion of fuel is not available for air heating purposes.

Type of gas burners used on process air makeup equipment is most important in that a satisfactory operation of either of the above types of heaters during the early spring and fall seasons is only obtainable when the gas burners are approximately of the "fully modulating" variety—that is, with at least a 25 to 1 turndown range.

Summary. 1. Initial survey of process and space heating loads is prerequisite to providing a plant with a proper and efficient process air makeup system. This initial survey forms the basis for sizing and selection of equipment as well as providing other necessary data for the final engineering and design of such systems.

2. Engineering Design. It is pertinent that whoever makes this initial survey and subsequent designs for such systems be qualified and experienced.

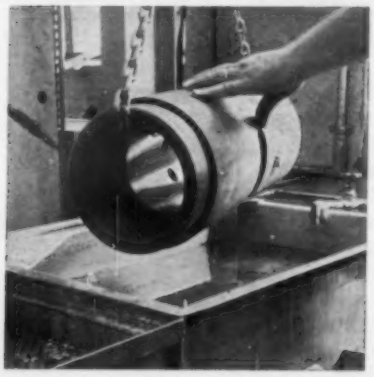
3. Your plant can benefit in many ways by looking into this important aspect of your operating cost. **End**



Ultrasonic cleaning installation includes generator, right, connected to a transducer tank center background. Castings are being lowered into this tank. After about 30 seconds, the parts are rinsed in cold water (middle tank) then they will be dipped into tank of rust preventive oil, located far left.

PARTS GET A SOUND CLEANING

Ultrasonic equipment helps Joy clean intricate parts for its hydraulic systems



Large cylinder for rock drill illustrates sizes that can be cleaned.

Complex castings like this valve block are also cleaned by ultrasonic energy.

FIELD SERVICE calls and replacements were costing Joy Manufacturing Company's Mining and Construction Division, Claremont, N. H., too much money and customer dissatisfaction. Unavoidable contaminants in the hydraulic systems of coal cutting machines, mobile drills, and other equipment, were traced by Joy to one source: poorly cleaned parts made from castings. This trouble-spot has now been eliminated with ultrasonic cleaning equipment.

The combination of chips, dust, core sand, and cutting oil formerly caused failure of hydraulic valves and pumps. Every conventional cleaning method for castings was tried: compressed air, agitated solutions, and strong, hot cleaners. None of them removed the really persistent grime. They installed ultrasonic cleaning equipment and the results were very satisfactory.

The installation consists of an APT-500 Sonogen ultrasonic generator and a six cubic foot stainless steel tank with 16 transducers, built by Branson Ultrasonic Corporation, Stamford, Conn. A cold water rinse tank and spray hose were added by our own engineering department, as well as an overhead crane for easier, quicker handling of heavy parts.

After the ultrasonic cleaning unit had been operating for a few days, the company discovered that some castings were rusting almost overnight. Production men found the new cleaning method was responsible. It worked too well; it removed the last traces of cutting oil, which formerly had kept parts from rusting. The problem was solved by adding a dip tank of Oakite Special Protective Oil as the last step in the cleaning procedure.

Some castings are cleaned in about 60 seconds, with 30 seconds an average figure. After cleaning, parts are dipped in a plain hot water rinse or flushed with a spray hose to remove detergent. Compressed air dislodges any accumulated grime that has been loosened by the ultrasonic bath.

Some 10,000 castings—mostly air and hydraulic manifolds—are cleaned in a year. Because ultrasonics is so quick and thorough, all cleaning is completed in about two or three hours a day.

Typical of the castings cleaned by ultrasonics are spool valves, used in the main operating system of Joy mining machines. The bodies are cleaned after machining to remove casting sand, grinding dust, and chips. Their complex shapes present no cleaning problem to the ultrasonic equipment.

If cast iron dust is not entirely removed, particles abrade the valve's chromium surface, eventually causing pressure loss and faulty operation. Bleeding of dark hydraulic fluid used to be quite noticeable, but now, by ultrasonically cleaning valve components, the company has solved this problem. **End**

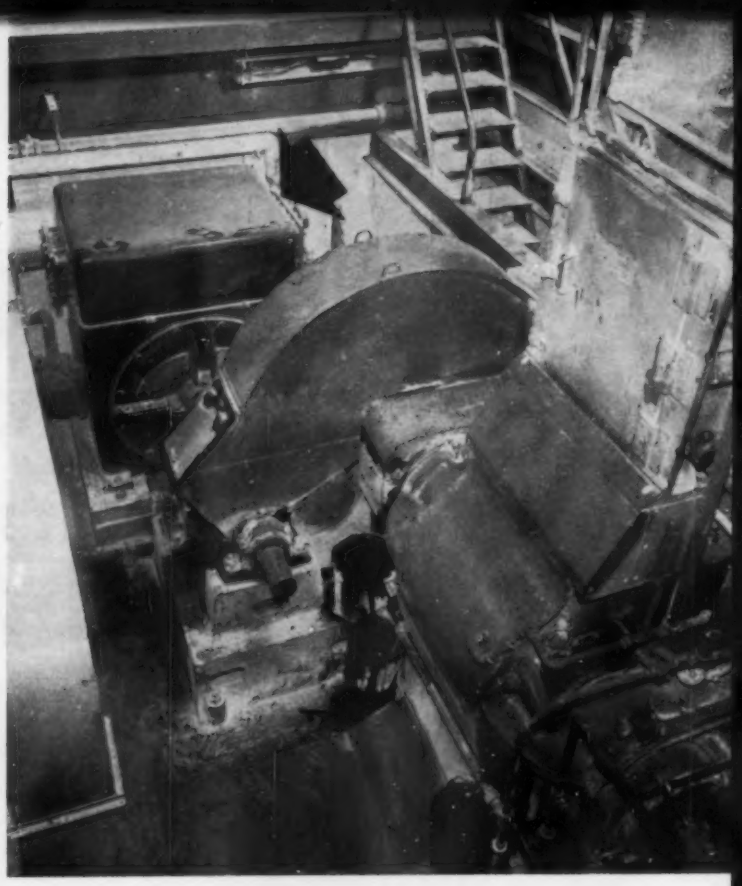


Fig. 1. Indoor totally-enclosed application with air-to-water heat exchanger driving a Banbury Mixer in a rubber mill.

MOTOR ENCLOSURES DETERMINE RELIABILITY

By D. A. HOLME, Product Planning Specialist, Small A-C Motor & Generator Department, General Electric Company.

SATISFACTORY PERFORMANCE of industrial motors is largely dependent on the selection of the proper enclosure. It is important for those associated with motor selection to know and understand the available enclosures, and the general reasons for selecting one over another.

The principal reason for various enclosures is to improve motor life under different circumstances. This generally means winding protection. Although other factors of motor life, such as bearing life, are also dependent upon the enclosure, winding protection is of greatest importance. This dependence makes it necessary that the motor selector know and recognize the types and differences in atmospheres and substances which are detrimental to winding insulation.

One of the most common injurious substances is moisture or water. By collecting on the creepage surfaces of the winding insulation, it tends to reduce the insulation resistance of the winding. Rarely is it in a pure form, and when in combination with certain dirt or chemicals, it may actually attack the insulation.

Moisture of water can get to the windings of a motor in a number of ways. Condensation as a result of rapid temperature changes during motor shutdown, water running in the motor or carried in by the air in the form of rain or snow, are common.

Principal purpose of the many varnish treatments used on motor windings is to fill up voids in the winding, making it difficult for water or moisture to collect. These treatments also help provide a protective coating against water and moisture when and if it does collect on the winding.

Another common substance injurious to insulation life is dirt. There are several kinds of dirt which may produce different detrimental actions.

One of the most troublesome kinds of dirt is the conductive type. It works into cracks in the insulation and collects on creepage surfaces, tending to short circuit the winding insulation. An example of the conductive type dirt is carbon black, found in many rubber mills, Fig. 1. It is very difficult to insulate against dirt of this sort, although various varnish treatments which tend to fill up crevices and make the winding a solid smooth mass are helpful.

Abrasive type dirt is very common. Its action is to scrape the insulation and thereby remove the protective coating. Abrasion is not dependent solely on the dirt being hurled at the windings. During the operation of a motor, the windings are subjected to many stresses and strains. In these periods, parts of the windings actually move with respect to other parts.

Therefore, an abrasive dirt which is on the windings or in the winding crevices, will be moved, tending to scrape the winding insulation. Abrasive dirt is found in many different locations such as cement mills and power stations, Fig. 2.

Various additional insulation treatments such as extra varnish dips and bakes will retard the effect of abrasive dirt. These treatments produce a smoother and more solid winding. Dirt particles tend to bounce off, rather than settle on the windings.

Some forms of dirt are not particularly abrasive or

conductive. This dirt can still cause a great deal of trouble by blocking ventilation openings, Fig. 3, raising the motor operating temperature.

There is a rule of thumb which states that the insulation life of a motor is halved with every additional ten degrees of operating temperature.

Although not so common as dirt and moisture, chemical substances can often be much more injurious and in a shorter time. Chemicals in the form of fumes or suspended in air may attack and destroy varnishes as well as the structural parts of the motor, Fig. 4.

They can be so destructive that a motor can literally disintegrate in a very short period of time. Aluminum and copper parts are particularly vulnerable to some chemicals. Induction motor rotors have been known to corrode and fail in very short order. Even the cast iron motor, the acknowledged leader in the chemical industry, has badly corroded in the short space of a year's time, under particularly extreme conditions.

To complicate matters, chemicals in the presence of moisture often form conducting electrolytes, causing motor failure. A good example is salt. Windings with salt can exhibit a high insulation resistance when dried out, but almost no resistance after the salt has absorbed moisture. Special insulation, such as multiple varnish treatments and various synthetic resins, may provide additional protection and thereby longer winding life.

Oil is another real problem. Although it does not attack varnishes as vigorously as some chemicals, it may soften and damage varnishes. Another property of oil is that it is difficult to remove, and tends to catch dirt. This can be a frequent problem as oil is a common substance found in motor areas.

One of the principal considerations in enclosure selection is therefore to reduce and minimize the adverse effects of various combinations and concentrations of moisture, dirt, oil, and chemicals.

There are a large number of enclosures from which to select depending upon the type of condition. Most of these are designed around definitions as stated in the National Electrical Manufacturers Association. NEMA defines two general types of enclosures; that is, "open" and "totally enclosed." All other enclosures are variations of these two basic types.

The definition of an open type motor is simply a motor whose ventilation openings are such to allow passage of external cooling air over and around the windings and other active parts of the motor.

The most popular type of open enclosure is the dripproof enclosure, Fig. 5. As defined by NEMA: "A dripproof machine is an open machine in which the ventilating openings are so constructed that drops of liquid or solid particles falling on the machine at any angle not greater than 15 degrees from the vertical cannot enter the machine either directly or by striking and running along a horizontal or inwardly inclined surface of the machine."

Motor manufacturers usually recommend the use of the dripproof enclosure indoors and in an atmosphere relatively free of abnormal moisture or dirt, Fig. 6.

Definition of the splashproof enclosure is almost identical to the dripproof, with the substitution of 100 degrees for the 15 degrees in the dripproof definition. The splashproof enclosure is designed for slightly more severe service than the dripproof.

For those areas where there is a high moisture condition, the additional protection provided by a splashproof enclosure is of little or no value. The use of the splashproof is therefore for those few marginal dripproof areas where a slightly improved mechanical protection against splashing or falling liquids and solids is needed.

NEMA defines three types of guarded or protected

Fig. 2, Above. Cement kiln drive application uses an outdoor totally-enclosed motor. Finned design dissipates heat faster.

Fig. 3, Right. Indoor totally-enclosed motor operating in an abrasive dust atmosphere. Example of clogged ventilation.

MOTOR ENCLOSURES

open machines. Basically the definition states that direct access to the live or rotating parts, with the exception of the shaft, of the motor is limited to the passage of a cylindrical rod ½ inch in diameter. This specification is normally accomplished with the addition of screens over the various openings to the motor.

Three types of open, guarded, enclosures consist of semi-guarded, guarded open, and dripproof fully guarded, Fig. 7. Semi-guarded means that only the openings of the top half of the motor are protected. The second type refers to all openings, but only to an open machine. The third and normally used type, refers to all openings on a dripproof enclosure.

The guarded machine is applied in those dripproof areas where there are dangers of falling objects, rodents, or where it is necessary to protect persons from the hazards of rotating machinery. The first cost of this type enclosure usually runs about 2 to 5 per cent over the dripproof cost.

A relatively new type of open enclosure which is becoming very popular for large motors above 200 horsepower, is the weather-protected motor. NEMA defines it as: "A weather-protected machine is an open machine whose ventilating passages are so designed as to minimize the entrance of rain, snow, and airborne particles to the electric parts and whose ventilating openings are so constructed as to prevent passage of a cylindrical rod ¾ inch in diameter."

Basically, the enclosure is designed such that the ambient air does not enter the motor on a direct line, but goes through a rather intricate path, thereby eliminating foreign material.

Use of this enclosure has been primarily for outdoor power station auxiliary motors, Fig. 8, pipeline motors, and other vital continuous process equipment. It is the only open type enclosure used extensively for outdoor service, and it has been applied specifically in those instances where a totally-enclosed motor is not economically justified. The first cost varies considerably with respect to the dripproof cost above 200 horsepower, but it generally is in the range of 120 to 150 per cent.

There are two other NEMA defined open enclosures. They are open externally-ventilated and open pipe-ventilated. These are rarely used and employ blowers or air from an outside source. The first cost varies greatly with the circumstances, and there is really no defined or standard area of use.

Second general type of enclosure is the totally enclosed. These enclosures are designed for severe service and outdoor applications. It is defined by NEMA as: "A totally-enclosed machine is one so enclosed as to prevent the free exchange of air between the inside and the outside of the case but not sufficiently enclosed to be termed air tight."

Popularity of the totally-enclosed fan-cooled enclosure is comparable to the dripproof enclosure, especially below 200 HP. It consists of a totally enclosed case with an external fan which blows air over the case, thereby improving the heat dissipation, Fig. 9.

One of the problems associated with a totally enclosed motor is that of heat dissipation. A general rule of thumb states that the amount of heat to be dissipated in a motor is proportional to the volume of its active material. Therefore, taking two similar motors, one twice the size of the other; the larger motor will have 4 times the area of dissipation, but 8 times the heat to be dissipated.

This becomes a definite limitation above 100 horsepower, requiring the fan cooled frame size to become increasingly larger than the dripproof frame for a given rating. Therefore, the relative cost increases with horsepower, and the totally-enclosed fan-cooled enclosure becomes less and less desirable economically, as the size increases.

Use of totally-enclosed fan-cooled enclosure is primarily for severe duty or outdoor applications with the exception of those areas defined as hazardous. The first cost of the fan cooled enclosure runs from 130 per cent dripproof in the low horsepower range, on upward to better than 200 per cent in the motors above 200 horsepower.

The totally-enclosed non-ventilated enclosure is similar to the fan-cooled in construction, but has no external fan and depends on an available air stream or radiation for heat dissipation. Its use is primarily in two applications.

One is where the motor will be placed in an air stream which is sufficient to perform the function of the fan in the fan-cooled enclosure. This is commonly known as an "air-over motor." The other is the so-called "short-time rated" duty cycle application which means a non-continuous type operation.

Here the motor does not run enough at near top speed to make a fan of much value, or run for long enough periods to heat up the motor sufficiently. The non-ventilated enclosure is not used often for large horsepowers.

Explosionproof enclosures are designed to prevent an explosion of surrounding atmosphere of vapor or dust, resulting from some action of the motor, such

Fig. 4. In chemical applications, totally-enclosed, fan-cooled motors are needed to properly protect insulation system.

as sparking on brushes or a winding failure. The type of hazardous conditions usually encountered are divided into classes, groups, and divisions in Article 500 of the National Electrical Code. The major classes are vapor and dust.

Hazardous location designation is left up to the various State and Local laws, as well as the requirements of insurance companies. As a practical matter, most of these groups use the National Electrical Code as a standard. The motors of all electrical manufacturers must be passed by the Underwriter's Lab., Inc. to be suitable for use in hazardous locations.

Explosion Hazards—Vapor and Dust

NEMA defines two types of explosionproof enclosures, namely explosionproof, for gas and vapors, and dust explosionproof. Although one motor may be built to operate in certain groups of both classes, the definitions are quite different. The vapor explosionproof enclosure is designed and defined to withstand an internal explosion without igniting the surrounding atmosphere.

This is usually accomplished by making the motor casting strong enough to withstand an internal explosion and by making all joints sufficiently long to quench any flame resulting from an internal explosion. The dust explosionproof enclosure is simply an enclosure which will prevent the ignition of surrounding dust. This usually means the necessary seals to prevent the dust from entering the machine. It does not have to be able to withstand an internal explosion.

Below 200 hp the explosionproof enclosure is usually of the fan-cooled or non-ventilated type. Above this horsepower, this type of enclosure rapidly becomes prohibitive from a first cost point of view. Another way of supplying the characteristics of an explosionproof enclosure is to use an inert gas filled enclosure with an air or water heat exchanger.

With the correct seals, and by maintaining a small positive pressure of inert gas within the enclosure, entrance of explosive vapors can be prevented. It should be remembered that the maintenance of the explosionproof feature is dependent in this case on a positive inert gas pressure being maintained inside the enclosure. Because of this, the enclosure does not carry code approval.

First cost of this type is prohibitive much below 1000 hp. Above this figure, however, the first cost reduces to somewhat less than 200 per cent of the dripproof. This value does not include some of the additional equipment needed to control and maintain the internal gas pressure.

Another totally enclosed type is the waterproof enclosure. It is not an enclosure which may be submerged but rather one which will prevent any leakage to a stream of water or liquid.

Construction may be the same as any other total enclosure with the addition of various gaskets and sealing compounds at the joints. Although the first cost is not much more than a normal total enclosure, it is rarely required except in naval and marine applications. The normal totally-enclosed motor will exclude water satisfactorily except in severe applications.

Totally-enclosed pipe-ventilated enclosures are of the non-ventilated type in appearance with the addition of

Fig. 5, Below. NEMA dripproof enclosure is constructed to exclude water falling at less than 15 degrees from vertical.

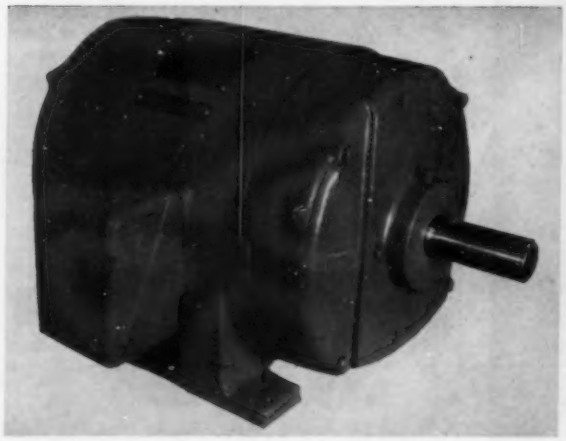


Fig. 6. Fully guarded motors are equipped with screens to protect windings and rotating parts against foreign objects.

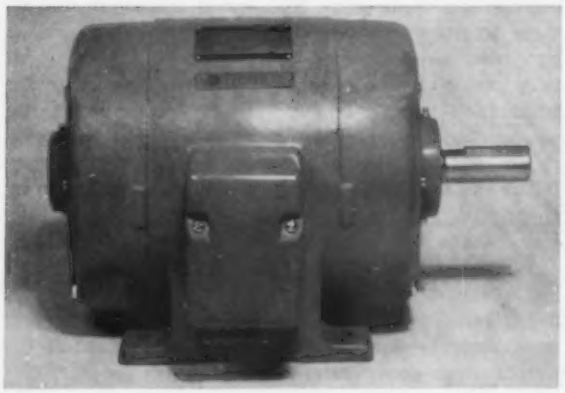
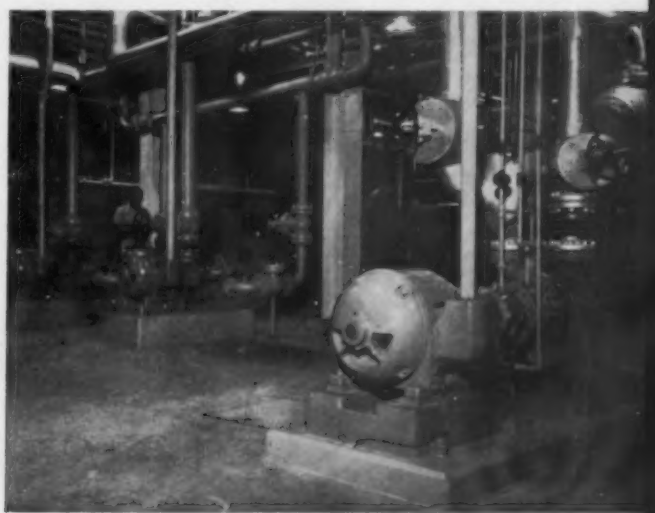


Fig. 7. Typical clean indoor pumping application ideally suited to use of low cost motors with NEMA dripproof enclosures.



MOTOR ENCLOSURES

intake and exhaust ducts to bring ventilating air in from somewhere other than the surrounding atmosphere. A machine with this enclosure may be self-ventilated or force-ventilated.

There are several good areas of application. Where it is desirable to protect the motor from very severe atmospheric conditions, where the noise level is important, where it is desired to keep explosive vapors out of the motor in those areas which are marginal and not specified hazardous, or where it is necessary to keep motor losses in the form of heat from adding to the room temperature, pipe ventilation is commonly utilized.

Force-ventilated motors have the additional advantage, in sizes above 250 hp, of significantly reducing the frame size which would be required by a totally-enclosed fan-cooled or non-ventilated motor in the same rating. This saving can actually result in lower first cost, even with the addition of extras, like duct work and blowers.

Totally-enclosed water-cooled enclosures are generally limited to large motors, as they require circulating coolant water through the internal parts of the motor. This is often done by putting water pipes through the stator core. The initial cost compared to other total enclosures precludes its use below several hundred horsepower.

A total enclosure of the non-ventilated type with the addition of a water-cooled heat exchanger and a fan to circulate the internal air through the exchanger is called the totally-enclosed water-air-cooled enclosure. It has the advantage of not depending on radiation or convection of heat from the motor frame as in the case of the non-ventilated or fan-cooled enclosures.

First cost below 250 hp is very high. Above 250 hp however, the first cost relative to the dripproof drops rapidly below 200 per cent and actually gets down to about 120 per cent at 5000 hp. It requires a source of coolant water.

Totally-enclosed air-to-air-cooled enclosures consist of an air-to-air heat exchanger with fans to circulate the internal and external air through the heat exchanger. They generally require a fairly large heat exchanger unit or a low ambient, but have the advantage of not requiring coolant water. They are rarely used as the first cost is usually high.

Last of the NEMA defined totally-enclosed machines is the totally-enclosed, fan-cooled guarded. It is simply a normal fan-cooled machine with screens, such that a rod of ½ inch in diameter may not come in contact with the fan. Its use is for the same type application as the guarded dripproof motor.

Economic Factors

Generally speaking, the final choice of enclosure must be, in the end, an economic one. However, there are a number of factors to consider before a good economic decision can be made.

It should be noted that the size of the motor has a great deal to do with the relative first cost of that motor. Below 200 hp, selection of a total enclosure is generally limited to totally-enclosed fan-cooled, totally-enclosed non-ventilated, and the explosionproof. Above 200 hp the totally-enclosed fan-cooled and non-ventilated costs become progressively prohibitive. This results in a shift of emphasis to some of the other enclosures, which in the smaller sizes are too high in first cost.

Figures 10 and 11 show relative first cost relationships for various enclosures on a horsepower basis. It should be noted that these graphs are based on 1800-rpm induction motors. With some minor differences, the relationships remain the same for other speeds except as the speed decreases, the changes of emphasis between the dripproof and some of the other enclosures occur at somewhat lower horsepowers.

The question of maintenance is a most difficult one to evaluate on an economic basis. There are no definite rules, and conclusions are largely from experience.

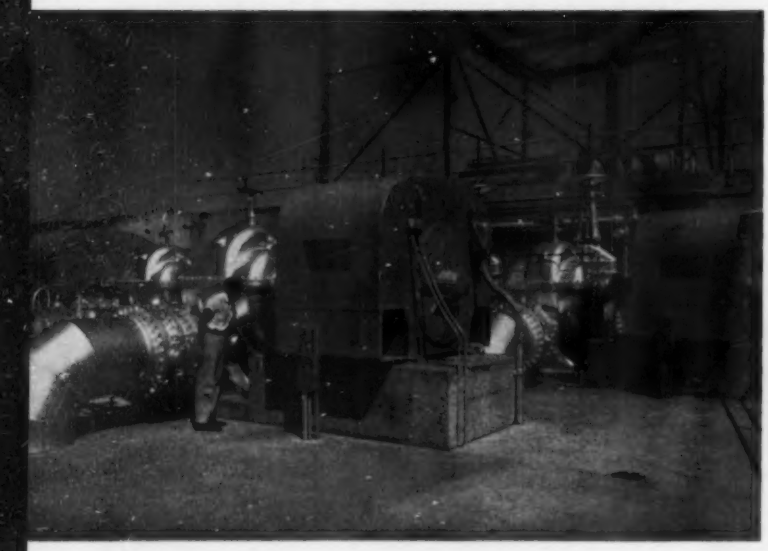


Fig. 8, Left. Power station uses this weather-protected motor designed to exclude rain and snow.

Fig. 9, Below. Totally enclosed, fan-cooled motor has external fan which blows air over case.

Winding life can be dependent on the maintenance procedures followed in a particular area. For example, sometimes a dripproof or splashproof enclosure may be applied in a rather dusty or dirty atmosphere, if the motor is periodically cleaned. If they are periodically checked, potential winding failures may be detected before they occur.

As a rule of thumb, rewinding a motor costs about 35 per cent of the first cost of that motor above 5 or 10 horsepower. In the small sizes, the relatively high cost of rewinding and the advantages of a new motor may make the purchase of a new motor more desirable than rewinding.

Bearing life is often greatly dependent on timely maintenance procedures. Dripproof enclosures may be used successfully in some adverse bearing atmospheres if a good periodic lubrication plan is followed. Replacing bearings is not as expensive as rewinding, and it is a rare case where bearing life is the sole determinant of motor enclosure.

The concept of "elapsed life" is becoming more apparent in industry every day. For the problem of motor selection, it simply means using a motor of expected life on an application whose equipment is expected to last the same length of time.

Another important consideration in enclosure selection is reliability. The cost of rewinding and maintenance, or even just cost of a motor can be small compared to the many thousands of dollars lost through the shutdown of vital or continuous process equipment, Fig. 12, due to motor failure.

Environment Is Important

Atmospheric and environmental conditions existing where the motor is to be used are perhaps of more general importance, since it is not restricted to specific areas or applications. It is, of course, closely tied with maintenance and reliability.

Another example of the factors involved in enclosure selection is the kiln drive application in the cement industry. Here the induction motor range is generally about 50 to 200 horsepower. The dripproof enclosure is often used indoors and the totally-enclosed fan-cooled outdoors. These motors are subjected to cement dust, which is very abrasive. There are also some mildly corrosive sulphurous fumes in some instances. The outdoor application naturally experiences rain and snow.

Many cement companies have a periodic motor maintenance program consisting of 'blowing out' the motors, regreasing, and replacing the bearings. This industry has found that for this application, periodic maintenance justifies the lower first cost associated with buying open enclosures for indoor use.

Handling sewage sludge with motors up to about 300 horsepower is a good example where the industry has gone to totally-enclosed units. This application demands reliability and long motor life.

Motors are exposed to sewage sludge which is inert and slightly abrasive. Sludge tends to reduce ventilation openings in an open machine and humidity often goes to 100 per cent. The total enclosure has been found necessary to meet long bearing and winding life

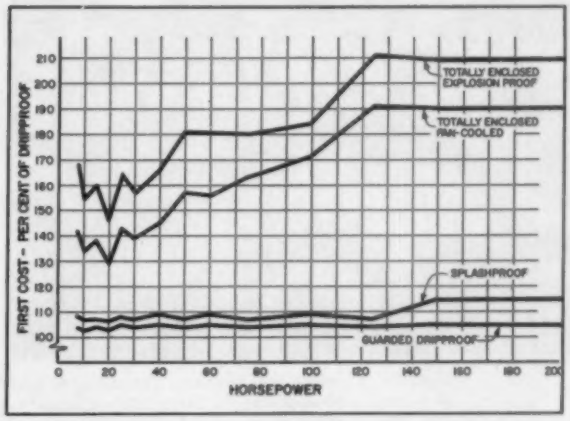


Fig. 10. Per cent motor first cost versus horsepower for 1800 rpm a-c polyphase induction motors in 1 to 200 hp range.

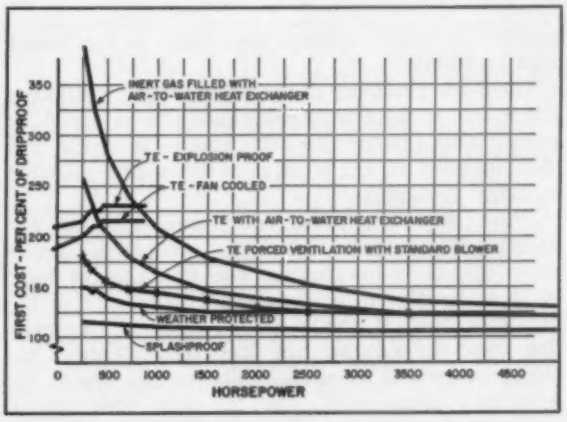


Fig. 11. Comparison of motor first cost versus horsepower for motors above 200 hp. Approximate for 1800 rpm motors.

required. In this case, reliability, long life, and low maintenance are the important considerations, with first cost being secondary.

Joint Industrial Congress, J.I.C., Specifications have actually standardized on totally-enclosed fan-cooled motors in the automotive industry for all machine tools from 5 to 50 hp. Not all applications in this range are severe enough to require this enclosure. The industry feels, however, that the high first cost inherent in such a standard is economically justified to assure reliability and to prevent the application of inadequate enclosures in marginal areas.

We have now considered the important factors governing selection of motor enclosure. Study of these points does not always result in a clear cut choice. The marginal cases are numerous and varied. Perhaps the most frequent problem is between an open-type enclosure and a total enclosure, primarily because of the relatively large differential in first cost between the two basic types.

Fortunately, there are a number of small changes or additions which can be made to the open-type motor to make it entirely adequate for an otherwise questionable application. It should be emphasized that these slight improvements are not sufficient to change

Fig. 12. Continuous process automotive line is example of application using indoor totally-enclosed motors meeting J. I. C. specifications.

MOTOR ENCLOSURES

a clean cut totally enclosed application to a modified open enclosure.

There are a number of special insulating treatments which can produce a longer motor life in particular areas. As an example, an extra varnish treatment will often improve the life of an open motor in a marginal humidity application.

There are other resins and varnishes which are particularly suited for improving winding life under other special circumstances. The first cost of most of these treatments is less than 10 per cent of the dripproof cost. It should be remembered, however, that these methods are not "cure alls." A more enclosed motor will often materially improve motor life over and above what can be done with special insulation.

Water will not condense on the windings of a motor when the motor is running, as the windings are then warmer than the ambient or circulating air. If however, the motor is shut down and allowed to cool down, this problem can be significant.

In the case of the open type machine, the right solution may be another enclosure. However, the use of space heaters is often perfectly satisfactory and considerably cheaper. The space heaters perform the function of keeping the motor temperature above the air temperature, thereby preventing condensation.

In certain cases, open type motors with filters may be applied in mild or moderate dust applications which at first glance would require some kind of total enclosure. This can be very successful in the case where a filter will remove a particular dirt which is troublesome. However, filters will clog up in time and it is necessary to clean them periodically.

Sometimes the severity of an application can be modified at less cost than the selection of a severe duty enclosure. An example is the erection of barriers or sheds which protect the motor from specific sources of trouble.

There are some areas where an inventory tax situation is an important consideration. In these areas it is cheaper tax-wise to use an open motor on a calculated risk basis and replace when necessary with a total enclosure.

These are but a few of the other factors which are sometimes important in particular areas or applications. They often depend on a calculated risk or former experience. Properly applied they often require improved motor protection from a control standpoint, and the over-all first cost is not wholly dependent on the first cost of the particular improvement.

Recent changes in motor design have brought about significant changes in motor enclosure selection. An excellent example of recent design change is the rerating program conducted by NEMA and the various motor manufacturers. Presently this program extends only to about 30 horsepower, although NEMA has suggested a program up through about 125 horsepower for induction motors.

One aspect of this program has been the virtual elimination of the need for the splashproof enclosure. The new motors of most manufacturers have end shields closely approximating the end shield of the former splashproof enclosure.

The new motors have also generally adopted the ribbed frame technique for totally-enclosed motors. The resultant large dissipation surface means the totally-enclosed motor is usually in the same frame as the corresponding open rating, especially below 100 horsepower.

Weather-Protected Motors

Another recent change has been the development of the weather-protected motor. It resulted from the comparative inadequacy of the splashproof and dripproof enclosures for reliable outdoor service and the inherent high first cost of totally-enclosed motors above 250 hp. This enclosure gives the user reliable outdoor service at far less than the totally-enclosed cost.

Naturally, continuing advances in insulation systems and materials have necessitated a reappraisal of enclosure requirements for certain applications. The development of silicone varnishes is a good example. These varnishes have improved the water repellancy of modern windings, enabling certain areas of water or moisture application to get reliable service from the dripproof enclosure.

Automation puts on increasing emphasis on reliability. As the trend toward automation continues, we will see more stress on long motor life and less maintenance, with a lesser regard for the first cost.

Improved insulation systems may meet the challenge of increased reliability. An example of a possible revolutionary insulation system is the "encapsulated winding." This is a winding completely enclosed in some sort of molded compound. Today such an insulation system has definite limitations; tomorrow it may not. This development might well eliminate the need for a total enclosure in many areas.

Automation's effect on the technique of motor manufacture is an important consideration. Automation is now demanding increased emphasis on motor standardization. As a result, relative costs of today may be completely obsolete in the future. Since the selection of enclosure and modification often is basically an economic one, such a change would produce changes of emphasis in their selection. **End**

Contented Cooks, Well-Fed Employees Will Thank You For a

WELL-PLANNED PLANT KITCHEN

By C. J. ALLEN, P.E., Associate
Albert Kahn Associated Architects
& Engineers, Inc., Detroit, Mich.

MANY QUESTIONS must be asked and answered before an industrial kitchen can be intelligently designed, for there is no such thing as a "standard" industrial plant kitchen.

First in importance is the number of people to be fed. Shift schedules and extent of "around-the-clock" operation will further determine the requirements of the kitchen. Again, a factor which has, in some instances, proven decisive is the anticipated influx of transients. Catering services available within the area may be capable of relieving the demand for preparation of food for these transients and thereby minimize capital investment in major equipment.

The type of employee to be served will govern the type of meals to be prepared. Obviously, foundry workers will eat more heartily than office employees, consequently quantities and types of food required will vary widely. A large number of executive or top management personnel may dictate the establishment of private dining rooms which may require a separate kitchen for preparation of more elaborate meals. Geographical area—both as regards climate and local custom—will vary the type of meals served and therefore affect the design as a whole.

In addition, relationship of the plant to existing feeding facilities must be considered. In some instances, adjacent buildings of the same company are so equipped that expansion of the kitchen and cafeteria facilities is feasible to accommodate increased demand for food service and/or preparation either through rescheduling use of existing facilities or addition of new equipment, or both.

There will be a number of fundamental functional areas defined in each design problem. Such elements, in part, are: Receiving, storage, refrigeration, vegetable and meat preparation, baking, pot and pan washing, scrapping and dishwashing, garbage counters, offices areas, toilet facilities, and private dining rooms.

A study of the lines of flow, traffic patterns, and working spaces required within and around the various elements is necessary in order to achieve a good workable layout. Relationships which will be emphasized are dependent on type and method of operation of the kitchen and the judgment of the designer.

Relationships, in a negative sense, must also be considered, for example, in the isolation of food prep-

Fig. 1. Dwarf wall, left, can be used to conceal horizontal piping to kettles, but care must be taken to provide access for maintenance of the equipment.

Fig. 2. Canopy is necessary for exhaust of odors and vapors from kettles, steamers, ranges, ovens and fryers. Note the vapor-tight light fixtures.

PLANT KITCHENS

aration areas from scrapping and dishwashing operations, can washing areas, and garbage rooms. Noises emanating from kitchens should be considered, also, in determining the location of private or executive dining rooms. Local health and plumbing codes often impose limitations on location of equipment and clearances around fixtures.

There are many items of architectural and structural design which must be considered in planning an industrial plant kitchen.

Canopies are required over kettles, steamers, ranges, ovens and fryers to provide for exhaust of odors and vapors. Such canopies, as shown in Fig. 2, generally support grease filters, light fixtures, steam piping for fire quenching, and may be required to support plaster furring in installations where canopies must be furred to the ceiling. The resultant weight may require special structural design to provide adequate support. In addition, architectural and structural co-ordination with equipment design is necessary to determine hanger rod locations.

Drip pans recessed into the floor construction are desirable under peelers, kettles, and can washers. This construction necessitates a depressed floor slab in areas where the pans are to be located. When a drip pan is turned up along a wall, care should be exercised in the pan design to have the edge turned back at a height compatible with block coursing of the wall construction.

Walk-in refrigerators generally require a depressed floor slab to permit installation of proper insulation. The floors, however, should be level to facilitate trucking. Access must be provided for servicing of the refrigeration equipment if such equipment is to be concealed, and consideration must be given to adequate ventilation of the space around the motors.

Ranges, fryers and ovens are often set on concrete bases. Close checking of equipment design for required base dimensions is mandatory to insure a satisfactory fit and uniform overhang of equipment over the bases.

Tray and dish conveyors usually are required to pass through a wall. This is a point for verification of dimensions and detailing between architectural and equipment design. Support for conveyors more often than not is from a wall rather than the floor, and adequate provision must be made to properly support the expected loads.

Use may be made of dwarf walls in which to conceal horizontal piping behind lines of equipment, Fig. 1, but care must be exercised to provide access for cleaning, also for servicing and maintenance of valves, traps, and similar mechanical equipment. Routing of supply piping and vents from dwarf walls will invariably require a pipe shaft to the ceiling. This is often of stainless steel construction with a removable side.

Mechanical Requirements

The mechanical and electrical features relating to connections to stock items of equipment are, in most cases, clearly defined by the manufacturer of the equipment. Sizing of supply piping should be based upon normal pipe sizing practice for the demands served. The peculiarities of local plumbing codes, however, may require modification of the equipment or may dictate the manner of supply, waste or vent piping. Requirements for air gaps or vacuum breakers on water supplies to dishwashers, hose connections, peelers, garbage disposers, and washers should be investigated, in particular, as well as provision for venting grease traps, sinks in free-standing tables, and floor drains.

While the hot water supply to general lavatories may be at 110 to 120 F, kitchen sinks should be supplied with water at a temperature of 130 to 150 F, and dishwashers must be supplied with water at 180 F. The latter requirement is usually satisfied by the installation of a booster heater—either electric, gas or steam —though in some instances hot water may be generated and stored at the higher temperature with direct service to the dishwasher and a mixing valve provided to serve the lower temperature demands.

Steam to the kitchen will require a service pressure of from 5 psi to 30 psi depending upon the equipment to be served. Most equipment requires pressures in excess of 5 psi. Many standard items of kitchen equipment, such as steamers, may be supplied with pressure regulating valves by the manufacturer. Steam and return connections may be required for kettles, coffee urns and heaters, while direct steam (without return) is used for steam injectors in pot washing sinks, quenching systems under canopies (to blanket grease fires at filters), and some bake-ovens.

The ventilation of kitchen equipment is usually limited to a relatively few locations. Exhaust from the canopies over ranges, fryers, ovens, kettles and steamers, and direct-connected exhaust from dishwashers constitute the bulk of the exhaust requirements for the equipment.

Ventilation, either natural or forced, of refrigeration compressors is an item which is sometimes overlooked.

In regard to the canopy exhaust, it is desirable to discharge this separately to the outdoors. In spite of filters, some grease particles will be carried through and moisture will condense in the ducts. The use, therefore, of welded duct construction, with provision for drainage, is recommended. The dishwasher exhaust duct, similarly, should be watertight. Flanges on equipment for vent duct connections should be of suitable size and rigidity to allow proper fastening to the equipment.

Selection of Equipment

Selection of the type and size of equipment to be employed depends on the basic functional requirements and the technique of operation to be followed. Here are some suggestions about equipment size and selection:

Refrigerators range in size from small residential types to walk-in boxes, and temperatures range from freezers to vegetable refrigerators. In the larger units remotely located compressors and condensers are the rule.

Vegetable peelers are mandatory, or nearly so, in all but the very smallest of industrial kitchens, and typical equipment varies in size from portable peelers, with 15-lb capacity, up to fixed 30-lb units.

Steamers are applicable to the cooking of vegetables, meats, poultry and seafood. They are generally compartmented and consist of from one to four sections arranged vertically and independently operable. Minimum steam pressure of approximately 5 psi is required for service to steamers. Generally a pressure reducing valve is included as a standard item to supply 15 to 100 psi to equipment.

Kettles are used for stewing meats, cooking vegetables, fowl, stews, sauces and soups. This equipment varies in size from the small 5-quart kettle to 40-quart table top models (usually tilting type) to the free-standing pedestal type of 20 to 60 gal capacity, and larger.

Commercial ranges are available for operation on either gas or electricity, the choice of fuel depending largely on availability and cost of the appropriate service and/or owner preference. Variation in required range capacity is usually accomplished by installing a number of relatively standard range units.

Bake ovens are manufactured in a variety of standard sizes and models for gas, electricity, or even oil or coal firing. Generally, a low pressure steam connection is furnished for browning baked goods.

Fryers, as in the case of ranges, are available for use with gas or electricity and in standard sizes.

Mixers are available in sizes from small residential type units through 140-quart, floor-mounted, 3-hp, multi-purpose machines, with a selection of accessories and attachments for whipping, grinding, chopping, slicing, etc.

Coffee urns are most generally located at the cafeteria counter rather than in the kitchen proper, depending on usage, and may use steam, electricity, or gas as a heat source. Steam, however, appears to have the advantage of a greater rate of coffee production although proper selection of urn size may permit a lesser rate of production depending on demand. Steam pressure between 10 psi and 20 psi is desirable for adequate heating rate.

Can washers are often required in the larger industrial kitchen to minimize the disagreeable problems associated with trash disposal.

Pot sinks are an essential part of kitchen equipment. They are generally multi-compartmented and should be equipped with a steam injector in one compartment to permit the higher temperatures required for proper cleaning of pots and pans. See Fig. 3.

A glasswasher, although desirable in any installation, may be required in the large kitchen. The all-purpose dishwasher, however, very often serves double-duty.

A dishwasher is another piece of equipment essential to the efficient operation of the modern industrial plant kitchen. Dishwashers may consist of anything from the small batch-type, manually-fed machine, to the large continuous, automatic, multi-compartmented machine, per-

Fig. 3, above. Pot sinks with several compartments are essential. Steam injector permits necessary high temperatures.

Fig. 4, below. Automobile assembly plant kitchen has work tables, ranges, etc. Note enclosed piping at end of tables.

PLANT KITCHENS

haps 25 ft long. All machines have a common requirement of high temperature water (180 F) which usually necessitates the installation of a booster heater, either steam or electric, for the hot water supply.

A conveyor to return soiled dishes to the dishwashing area is an essential piece of equipment in many kitchens where self-feeding is required. Such conveyors are customarily rubber-covered, belt-type, with special provision for belt scraping and drainage.

Scrapping tables to which soiled dishes are returned are generally furnished with some type of spray rinse for pre-cleaning the dishes and a garbage grinder for disintegration of solid scraps.

An ice machine to provide flaked, crushed, or cubed ice may be located in the kitchen, although it serves, primarily, the adjacent cafeteria counters.

Cooks' tables must be provided and are generally furnished with a pan rack mounted above, a lower shelf, and one or two drawers for utensils. In some installations, these may include space on top for small powered equipment such as slicers, saws, etc. If much baking is to be done, a separate bakers' table may be desirable. General table space is required for meat, vegetable and salad preparation.

A hand washing lavatory should be provided in all kitchens, and many plumbing codes specifically spell out this requirement. In addition, separate toilet facilities for kitchen personnel should be considered, and a janitors' closet should be located in the area.

Grease traps are required to serve pot washing sinks, kettles and dishwashers. They may be located above or in the floor, the majority being recessed in the floor. Adequate access for removal of the cover for cleaning must be provided. Generally, the wastes entering the grease trap are at high temperature and precautions must be taken to minimize leakage from caulked joints in the waste piping. Screwed cast iron drains have been successfully used.

Perhaps the single most important concept in kitchen design is to design for cleanliness. Detail in layout will avoid inaccessible corners and spaces between items of equipment. Detail in kitchen equipment design will minimize cracks, crevices, slots and holes where food particles can accumulate, and it will provide only large smooth surfaces permitting ready washing and wiping. Detail in piping, see Fig. 4, will permit the concealment of piping in furred spaces, or in cabinet enclosures for pipe which must remain accessible. Any piping which is exposed should be suitably finished in chrome, nickel plate, or stainless steel to avoid painting and to facilitate cleaning. **End**

THAT FIRST BLIZZARD— ARE YOU READY FOR IT?

By **NORMAN PARNES**
Gen. Foreman
Plant Maintenance
The Martin Co., Baltimore, Md.

LOCATED AS IT IS, in a section where blizzards are the exception rather than the rule, the Baltimore Division of The Martin Company maintains minimum equipment coupled with a highly organized plan of snow removal to keep the plant functioning.

The emergency plan and its preparation receive the greatest consideration. Vehicles, rather than the man, are assigned to a given area.

Definite routes and sections must be laid out for each piece of equipment if the job is to be complete and no area missed. A map filled in with various colors shows the routes and sections for each vehicle, enabling an operator to know the exact boundaries of his work section.

At the same time that Martin's own equipment is being readied, arrangements are underway to requisition, if needed, dump trucks, road scrapers and front end loaders from outside contractors. This is an added precaution in case the situation should develop to proportions exceeding the limitations of company equipment.

Maintaining the machines in first class operating condition is a big factor in any snow removal plan. Long before snow is expected the machines are checked and prepared for the winter's work. During their inspection and overhaul, the hydraulic system for dumping and the snow plow pump are given as much attention as the engine.

A practice that goes a long way toward eliminating delays, permitting the equipment to perform at top efficiency, is the use of snow plow wax, which allows the snow to drop easily from the plow blades, eliminating the need for the operator to make frequent stops to clean them. This, in turn, permits more snow to be moved with less equipment. An added advantage of wax is its rust preventive property. **End**

This sign greeted Japanese plant engineers as they entered the conference and show building.

JAPANESE CONFERENCE AND SHOW ATTRACTS MANY PLANT ENGINEERS

PLANT ENGINEERS from the numerous industrial areas in Japan gathered in Tokyo from June 1 through June 4 to take part in a Plant Engineering and Maintenance Show. This is the first time an engineering conference and show of this nature had been held in Japan.

Shown on this page are several of the many pictures taken at this event to call to the attention of plant engineers in the U. S. A. just what their counterparts overseas are doing.

Extracts from a letter sent to Richard H. Morris, Editorial Director of PLANT ENGINEERING, by Tsuneo Ono, Executive Vice President, Nippon Management Association, Tokyo, Japan, will give you an indication of the success of this first endeavor.

"The congratulatory messages you and Mr. T. E. Hanson (Editor, PLANT ENGINEERING,) sent us were put up on the wall nearest to the entrance of the show and, we are sure these messages did enhance the reputation of this event. I should like to take this opportunity to express my deep gratitude for your many kindnesses shown us in connection with the show.

"The show was attended by over 10,000 visitors. The number of companies exhibited in the show was 105. Conference meetings, held at the same place as the show, were attended by so many people that the place was always full to the doors.

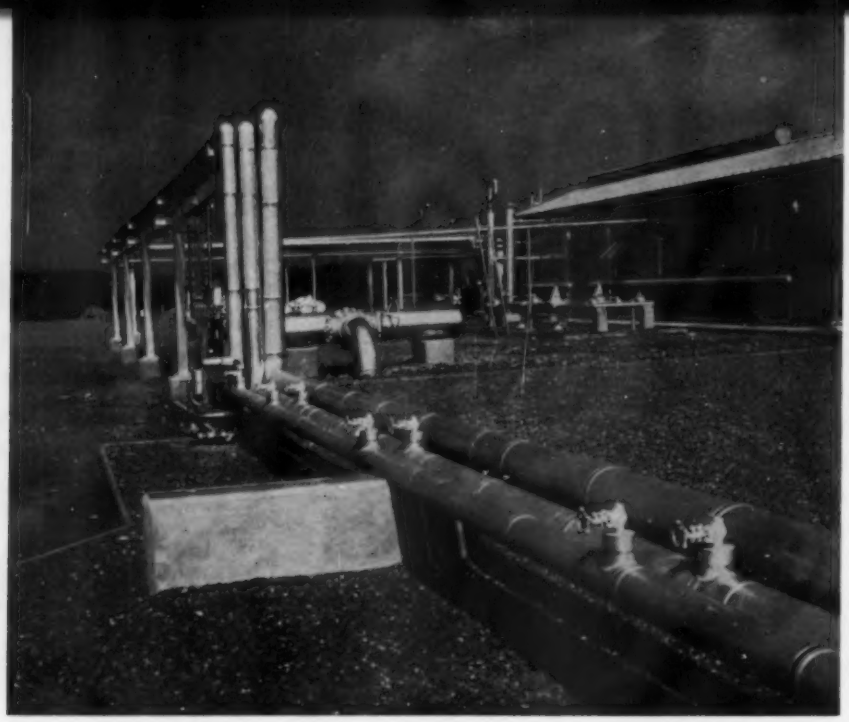
"In the show, we introduced, through the material sent by you, how plant engineers are being organized in the world as well as the organization of the AIPE. It was found to be very useful as it made people more interested in the matter. We are convinced that it has paved the way for organizing plant engineers in Japan. In addition, we introduced how maintenance shows are being held in the U. S. A., which, also, created a sensation among the people who attended.

"The success of our first conference and show has encouraged us. We are planning to hold them every year from now on. It is our hope that the conference and show will keep developing until it becomes internationally reputable." **End**

Above right: Congratulatory messages were posted near entrance to the show.

Center right: The conferences were well attended by Japan's plant engineers.

Right: View of one of the aisle areas. Show attracted over 10,000 visitors.



SECTIONAL PIPING INSULATION SIMPLIFIES INSTALLATION, REMOVAL

Time and labor to install insulation or service line has been reduced by combining insulation material, moisture barrier and aluminum jacket into one unit

OUTDOOR STEAM LINES and equipment at the recently completed first unit of Leidy compressor station in north-central Pennsylvania were covered with a new prefabricated insulation system. The metal-jacketed insulation takes less time to install and reduces time and effort required for normal maintenance.

Leidy station serves Leidy storage pool, which when ultimately developed to its full capacity will be one of the largest gas storage facilities in the world. New York State Natural Gas Corporation constructed the facilities and acts as operator. The other two participating companies are Transcontinental Gas Pipe Line Corporation and Texas Eastern Transmission Corporation.

The station incorporates almost two linear miles of outdoor steam supply and condensate return lines. These lines are essential for providing heat for processing natural gas as it leaves or is pumped into storage as well as for space heating of the buildings housing operating equipment and personnel. Some outdoor equipment, up to 24 in. in diameter, is also insulated.

Situated in a sparsely populated and mountainous area of Pennsylvania, all materials and labor for construction of the compressor station had to come a long way. As normal plant maintenance problems must be handled by the resident staff, it was established during engineering and design of the station to emphasize materials that would make expected future maintenance as easy as possible for operating personnel, as well as reducing necessary erection time, labor, and jobsite fabrication.

A large amount of piping and equipment is situated outdoors, exposed to the winter storms prevalent in the area, as well as spring rains. As a result, insulation for outdoor steam lines and process equipment of necessity has to be jacketed for protection. In addition, with almost two miles of exposed steam piping, running from 12 in. high-pressure steam supply mains down to ¾ in. for service branches, it was extremely desirable to use an insulation system that is rugged enough to offer the mechanical and thermal protection required. It should also have the ability to be easily removed, without damage, and replaced following normal maintenance and repair procedures on the steam lines, and processing equipment.

A relatively new insulation system developed by Johns-Manville

was specified by Fluor Corporation, designers and engineers for the station. Called Metal-On, it consists of high temperature Thermobestos (calcium silicate) pipe insulation, prefabricated at the manufacturer's plant with a moisture barrier and a special aluminum alloy jacket to give it good strength and corrosion resistance.

The aluminum alloy jacket has a smooth satin finish which will not hold corrosive dust or other particles. Due to its finish the jacket is self-cleansing when it becomes wet during storm periods, yet it does not give off a blinding reflection in bright sunlight.

During plant construction, application of insulation and jacket in a single operation saved an average of 25 per cent on erection time, for all sizes, according to the contractor. In addition, insulation was never exposed and was never in danger of being wet during installation, thus preventing the electrolytic corrosion of the aluminum jacket that often occurs where insulation, isolation felt, and metal jacket must be cut to size and installed separately in widely spaced operations.

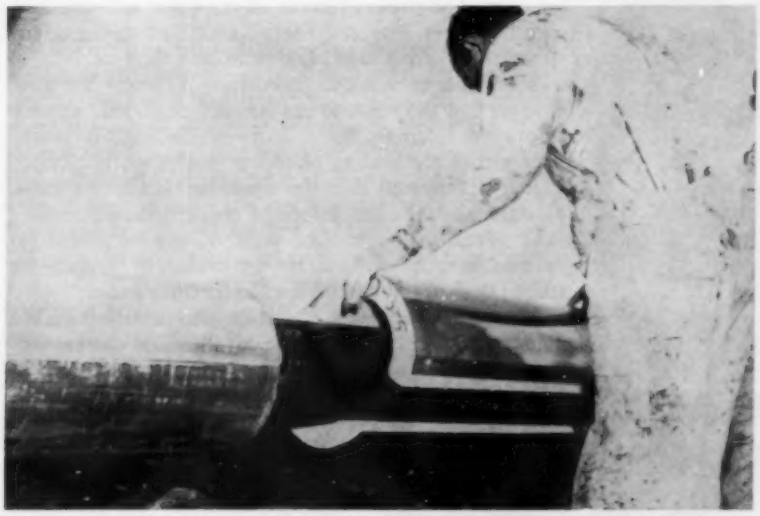
An experienced man can apply a length of the insulation and strap it in place in 90 seconds, from carton to finished piece. And each length includes the prefabricated insulation, moisture barrier, and metal jacketing. Thus the triple operations of separately measuring and cutting insulation, moisture barrier, and metal covering have been combined into one single step.

Supplied in 36-in. lengths, the material can easily be cut on the job with portable power or hand saws. Cut-outs are also easily made for hangers and supports. Joints are made with aluminum straps that snap in place in a similar manner to the jacket lengths of insulation, and are held in place with mechanically applied metal bands.

Jacketing, combined with a special locking device that snaps closed and seals the longitudinal joints, locks out moisture and weather permanently during installation and service life. This same locking device allows the sections of jacketed insulation to be removed and replaced at any time that trouble shooting or maintenance requires.

The insulation system incorporated prefabricated units for covering fittings and valves on all the steam and condensate lines as well. The saving in labor on this facet of the job alone was considerable, and the fact that these can be removed and replaced at any time without damage will add up to future savings that depend on the amount of maintenance and plant expansion that will come. For equipment and valves from 12 in. up to 24 in., preformed metal covers were combined with field-fitted insulation and isolation felt, also reusable for the most part.

With the station in operation now for almost a year, and the first heating season successfully completed, Head Station Engineer Victor Cummins reports no insulation problems. With painting completely eliminated on this insulation system, his maintenance crews can devote their time to other tasks. And the expansion-contraction cycling and erosive effects of a severe winter have in no way dimmed the appearance of the insulation system. **End**



Above: Lengths of prefabricated insulation are applied by simply snapping the integrated piece over the pipe. If cutting is necessary, it can be done with a hand or power saw.

Right: Closeup shows how snap strap, incorporating special barrier seal, is placed over insulation before banding.

Far right: Banding tool is used to tighten bands that hold adjacent sections firmly in position. This joint as well as the longitudinal locking joint are both completely water-tight.

Using Photography TO ANALYZE, PREVENT PLANT ACCIDENTS

PHOTOGRAPHS CAN PLAY an important part in accident prevention, according to Earl R. Wallace, Senior Safety Engineer of the Kodak Park Works, Eastman Kodak Company, Rochester, New York.

To be effective in accident recording, accident analysis, and accident prevention, photographs must be so taken as to reveal certain specific information:

How big an area should be photographed? What is the center of interest? What is this picture trying to answer? What experience is it trying to record? And, what value will the finished product have if the above questions are answered properly?

Here are three instances where photographs were used to study and analyze accidents:

At the Eastman Kodak Co. an employee, while operating a fork truck on a loading platform, placed the dock plate in position and then backed the truck across the dock plate into the railroad car. As the employee did this, the dock plate slid in such a manner that it fell from between the dock and the car and landed in the street.

The fork truck fell between the platform and the street with the forks and mast hooking on to the door frame and a wheel hooking on to the platform. The driver's seat and part of the back caught on the freight car door. The battery fell out of the truck and smashed onto the street. Pictures, Figs. 1 and 2, of this accident were taken and it was easy to explain it.

What can be learned from such pictures? First, it appears that the railroad car was not positioned exactly before the loading dock doorway. Second, it would appear that the loading plate was not properly pinned. Third, it appeared that the operator backed his truck onto the loading plate before he checked the pinning.

How can this picture be used? It can be posted on bulletin boards to illustrate the value of proper lift truck operation; it can be used in foremen's meetings or truck training programs; it can be used to determine the extent of damage to a vehicle, to illustrate the reasons why rules are so strict on the proper positioning of railroad cars to dock entrances; and better than this, as a constant reminder to fork-lift truck operators that every detail must be thoroughly checked.

A second picture was taken from the opposite side of the same accident. By showing a second position one can often see a detail that would normally be missed, see Fig. 2.

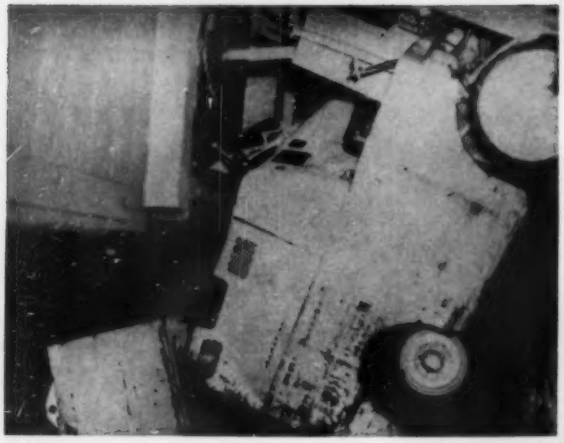


Fig. 1. Top: One of the two photos taken of the fork truck that crashed between the loading dock and the railroad car.

Fig. 2. Bottom photo, above: Second picture taken from opposite side. Often two photos will reveal added detail.

Fig. 3. Below: Photo shows how an operator of another fork truck was injured due to errors in operation of truck.

Fig. 5. Right: Here is a similar truck with a guard provided for operator protection. Photo shows guard details.

Fig. 4. Below: This photo demonstrated to management the need for protecting operators in all storage locations.

Another accident occured when an operator backed his truck into the location for charging the battery. He failed to note the guard rail around the charging location, and was struck in the rear by the railing. This pushed him forward into the truck which was still moving and caused the reverse shifting lever, located about 8 in. down the side and back of the truck, to strike him in the upper right leg. See Fig. 3.

The series of pictures taken after the accident show how easy it is to explain the story by use of photography in accident prevention and in which a different technique was used. This was a case of a major injury that was investigated, discussed with witnesses and then reset so that pictures could be made as a record. In the first picture a truck was shown at a charging station as it was positioned the day and time of the accident.

In the second picture, the truck was shown in position with the operator as he was at the time of the injury, with his hand on the control lever. Lever was in the same position as when the operator backed the truck into the charging location.

The picture illustrated the mistake made by the truck operator when he backed into the charging station, and how he was injured. It also shows that perhaps the reverse lever could be placed in a safer location.

In another area, by taking pictures of an accident shortly after it happened, a dangerous situation was rectified. Heavy bales of alpha pulp which had been piled eight bales high in a storage area tipped over on to a passing fork truck as the operator was carrying a load into the storage room. Prior to this time it was not thought necessary to provide overhead guards on fork trucks for this type of operation.

However, after the photographs were taken, shown in Fig. 4, top supervision was convinced of the need for providing complete protection for the operators of fork trucks in storage locations. The second photograph in this series, Fig. 5, showed the operator of a similar fork truck with the guard provided. The photograph showed in detail the way the guard was constructed, how it was fastened onto the truck, how it protected the operator's heels and how it gave him complete overhead protection.

Fig. 6. Supervision in various areas of a plant become so familiar with unsafe conditions they are unaware of them. A photo, like that above, makes condition more apparent.

Photographs can also be utilized for showing various sections of interior and exterior company properties that need housecleaning for accident prevention. Pictures will show in detail dangerous situations and can be used to "sell" a cleanup campaign. Fig. 6.

Excessive use of photographs should be avoided. They should be used only when a point cannot be made or a situation described, without them. It is important too, to make adequate and careful preparations in advance of taking the photographs to ensure that the pictures really tell the story. **End**

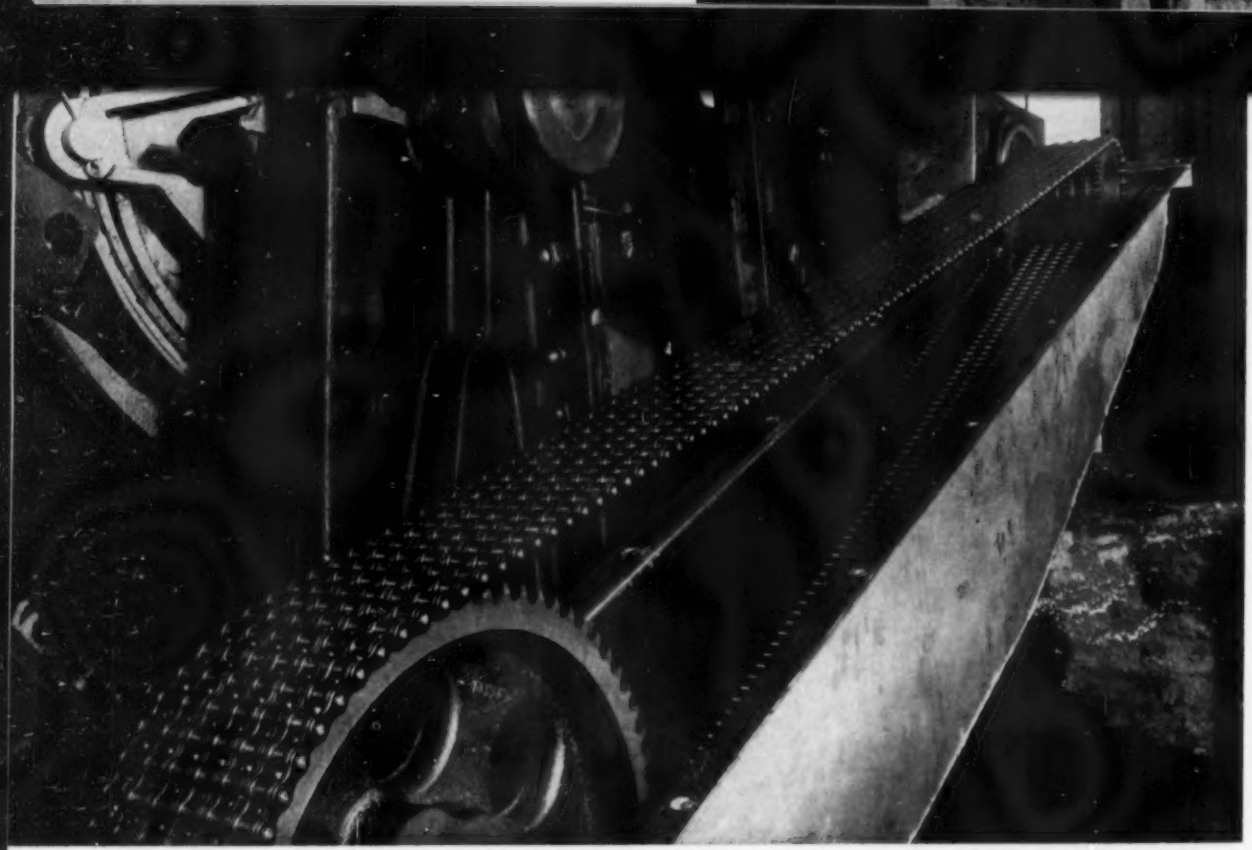


Fig. 1. Open casing on locomotive crane exposes this six-strand roller chain used for the main drive power transmission.

WATCH THOSE ROLLER CHAINS! FIT AND LUBRICATE 'EM RIGHT

By R. C. FISBECK, Diamond Chain Co., Indianapolis, Indiana

PLANT ENGINEERS know that after a piece of equipment is installed, the service life of that equipment depends on the maintenance it receives. If you want to get your money's worth out of the initial investment in your roller-chain drive, you want to obtain the maximum trouble-free service life possible, and that means proper maintenance, usually at small cost.

A roller chain is a precision-built piece of equipment consisting of a series of small bearings. Case-hardened pins and bushings are designed to resist wear, and connecting links have more than sufficient strength to withstand shock overloads.

The manufacturer, to the best of his knowledge, has made the roller chain and sprockets to give trouble-free service, but the user must provide proper maintenance. Such drives will give years of satisfactory performance before the chain requires replacement, and the sprockets should give equivalent service.

First in importance is proper installation. The drive must be correctly aligned, level and parallel. The sprockets should be true running, with as little weave or wobble as possible and securely fastened to the shaft. The higher the speed of the drive, the more important these details become. The roller chain should be installed on the sprockets not too tight and not too loose. There should be a small amount of up and down movement at the mid-span of one chain span while the other is taut.

Movement Allowance

This movement should not be more than the equivalent of one pitch of the chain on short center drives which usually are not provided with adjustment to increase the center distance. The longer center drives could have more mid-span movement—say one and one half pitches—and they are usually provided with some means of center distance adjustment. Fiddle-string tight chains should be avoided because they produce unnecessary initial wear.

Roller chains will elongate due to normal wear as much as 3 to 3½ per cent, before they are considered worn out. If the sprockets should become worn, usually detected by a hooked tooth appearance, they should be replaced. It is not advisable to use a worn sprocket with new chain, or vice-versa, as it will accelerate wear.

The most important detail in proper maintenance of a high-speed roller chain drive is lubrication. Proper lubrication can be the difference between a few hours service life or years. First, the drive should be enclosed in an oil-tight casing. Then a method of lubrication must

be determined that will assure an oil supply to each pin-bush bearing throughout the chain's entire length in order to minimize metal to metal contact.

A good grade of non-detergent petroleum base oil should be used. The following listing shows lubrication recommendations for roller chains under different temperature conditions: 20-40 F.—SAE 20, 40-100 F.—SAE 30, 100-120 F.—SAE 40, and 120-140 F.—SAE 50.

If the oil becomes contaminated, then it should be replaced with fresh oil and the roller chain cleaned by washing in gasoline or kerosene in order to remove any abrasive material. After cleaning, dip in clean oil before re-assembling on the sprockets.

There are four basic types of lubrication for roller-chain drives. The proper type to use depends on the chain speed and amount of power transmitted. This information can be obtained from the horsepower capacity tables published in general engineering catalogs.

The four types are explained as follows: Type I—manual lubrication—where oil is applied with a brush or spout can preferably once every eight hours of operation.

Type II—drip lubrication—where oil drops are directed between the linkplate edges on both sides of the chain from a drip lubricator.

Type III—oil bath or slinger disc —where the roller chain actually runs through the oil sump. The oil level should be kept up to the pitch line of the chain at its lowest point while operating. A slinger disc system can be used to pick up the oil from the sump and deposit it on the chain by means of a directing trough.

Type IV—oil stream—where the oil is distributed over the chain by a circulating pump. The oil should be directed evenly across the chain width and on the inside of the lower strand. The use of heavy oils and greases should be avoided because they are too stiff to enter the small clearances in the roller-chain pin-bush bearings.

In Fig. 1, the six-strand chain and sprockets on fixed, non-adjustable centers are parts of the main power transmission drive of a locomotive crane. It has satisfied the conflicting requirements for 2300 rpm maximum of the driver sprocket, traveling forward, reversing, and about 220 rpm minimum of the driver, when lifting at 70-hp full load.

The short pitch of the chain and substantial sprocket sizes provide smooth, quiet service at high speeds and the number of strands assures capability for withstanding heavy pulls at low speeds.

Oil bath lubrication effectively limits chain and sprocket wear to the negligible extent that in the course of several years not even one of many identical installations has required chain replacement.

Many machines are designed to require different speeds on adjacent shafts, sometimes the direction or rotation to be the same and, in some cases, opposite direction of rotation. This can be accomplished by using multiple sprocket drives with idlers. Where opposite direction of idler rotation is desired, the idler sprocket must be located to operate on the opposite side of the chain from the driver sprocket.

Arc of Contact Increase

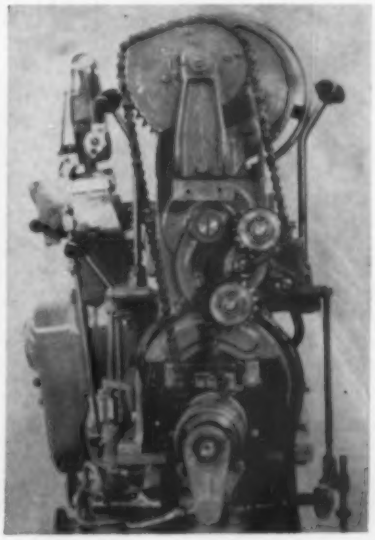
Such sprockets are located where they conveniently will produce an increase in the arc of contact on one or more sprockets, guide the chain clear of any obstructions, and take up for slack chain. Quite often, the idler is adjustable which would have the added advantage in controlling chain tension. A typical four-sprocket drive is shown in Fig. 2: an application on a woodworking machine using an intermediate pitch-roller chain from a motorized speed reducer.

An unusual roller chain application is shown in Fig. 3 on a textile machine. Note the sprocket shape on the top of the machine. It is not the usual round but a "cam" shape in order to keep the surface velocity of the work uniform throughout one revolution since there are two high and two low speed points to a revolution of the work and only one high and one low in a revolution of the sprocket. There is a 2:1 gearing in the machine head to provide double speed variation for both sides of the work. The chain is kept taut by means of the double idler pivot arrangement, one operating on each side of the chain.

Fig. 2. Drive on woodworking machine.

When power transmission problems come up, do not overlook the roller-chain drive. Roller-chain drives are positive drives, with high efficiency, no slippage, and periodic adjustments for tension are not required. They are relatively low in first cost and in cost of installation. Chain casings have been referred to as an added expense, messy and dirty because oil is required. They need not be if properly constructed to prevent oil leakage. Since all drives must be protected for safety reasons, the cost of a safety guard is considered, and the initial cost of a roller-chain drive, with casing, is frequently less than an alternate type of power-transfer drive. After proper installation, the drive requires a minimum of maintenance expense, will function for years. **End**

Fig. 3. Note unusual sprocket at the top.



PUTTING THE HUSH ON SOUND

Tape, Glass Blankets, Aluminum Can Help Dampen Plant Noise

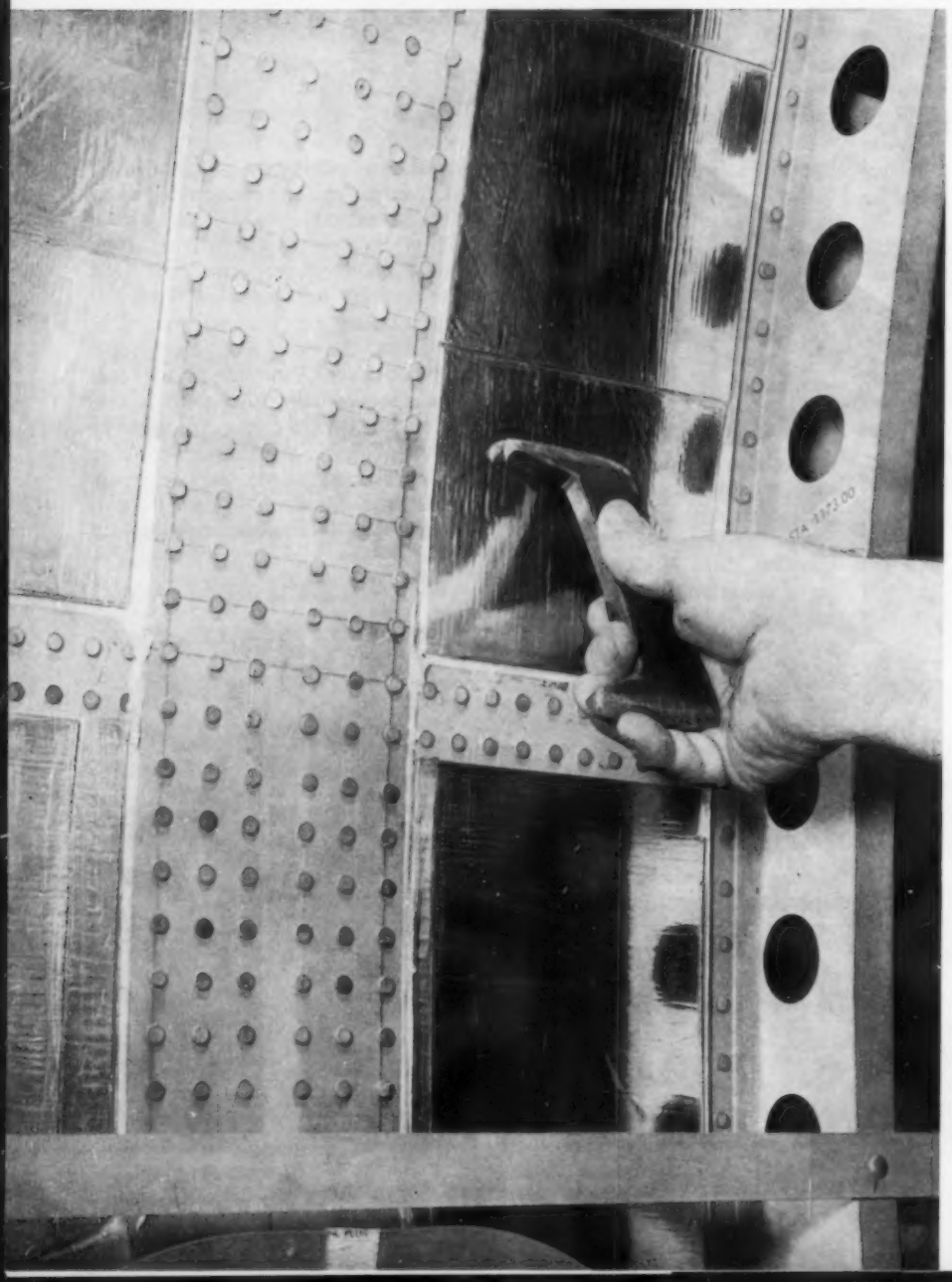


Fig. 1. Aluminum foil damping tape is bonded layer by layer to outer aluminum panel with special adhesive. This is the type of panel that promises to help solve some sound and heat problems.

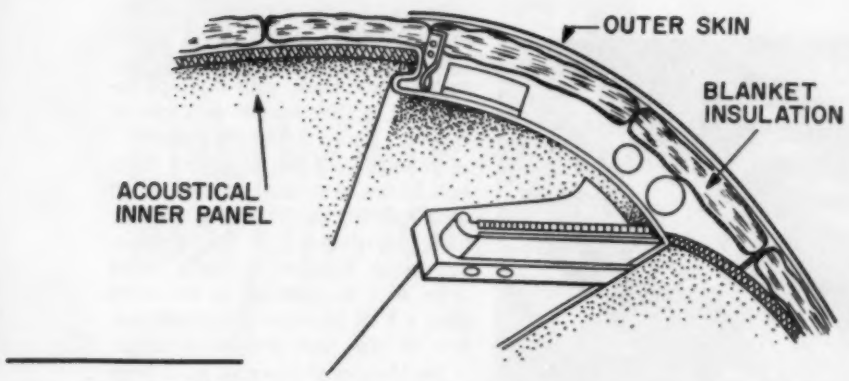


Fig. 2. Diagram of "sound sandwich" construction. Panels are 4 to 5 in. thick.

A FORMULA FOR noise attenuation at 35,000 ft and at nearly sonic speeds may help to muffle noise and isolate heat in many a plant with its feet on the ground.

The formula: aluminum damping tape+fiber glass blankets+nylon= a nearly sound-proof, heat-resistant wall.

At Convair Division of General Dynamics Corp., San Diego, Calif., the formula is used for the structural basis for fuselage sound-deadening in its 880 jetliner. The "sound-sandwich", which is a barrier to heat as well as noise, uses new techniques and some new materials to solve some old problems.

The problems: How best to construct in-plant walls and partitions which muffle and mute high-pitched and high-decibel noise; and how to achieve in such a wall a mating of materials calculated to shut out both heat and sound.

The sound-sandwich does both—and with startling efficiency. As well as shutting out heat, it reduces by more than 80 per cent the transmission of high frequencies (in the 10,000 cycles per second range), slashes low-frequency noise by more than 75 per cent.

Although the sandwich utilizes aluminum sheet (because of its high-strength to low-weight ratio) where most plant men would use less expensive acoustical material, the basic formula pertains as much to plants as to planes.

Plant uses, moreover, are legion:

Sound-sandwich walls can be constructed for mobility, used as temporary screening for super-noisy plant processes.

Permanent sound-sandwich partitions can isolate supervisory offices set down amid noisy manufacturing processes.

The super-thin, 4- to 5-in.-thick partition, which muffles sound better than most 8-in.-thick conventional walls, is a space saver. Moreover, its thinness permits it to be slipped into place behind or in front of existing walls which simply don't confine high-frequency noise.

A cross-section of the sound-sandwich looks like this:

Exterior "skin": aluminum sheeting, 0.063 to 0.10 in. thick.

Damping tape: applied to the interior face of the exterior skin are varying layers of aluminum foil damping tape. The foil is 0.008 to 0.012 in. thick. Bonded by special adhesives to the skin's surface, the damping tape, made by Minnesota Mining & Mfg. Co., effectively reduces noise some 2 to 3 db, vastly reduces vibration and in some cases cuts low frequency transmission (400 cps and up) by as much as 10 db (or, in other words, damping tape increased the transmission losses through the panel sections).

Glass fiber blanket: nested next to the foil-damped aluminum outer skin and separated from it by a 0.75-in. air space, are uncompressed glass fiber blankets, 2 to 4 in. thick. Blankets are wrapped in a lightweight, fire-resistant, non-porous nylon covering. Blanket flaps, about 2 in. thick and integral with the blankets, are wrapped over belt frames which in turn are fastened to the outer skin.

Non-porous inner wall panel: in some Convair sandwich partitions, the inner panel is acoustical, non-porous plastic.

Result: a sound-sandwich 4 to 5 in. thick, which muffles sound across the entire audible range and which also acts as a heat barrier.

Lightweight and fire-resistant, the sandwich aims at mating high transmission loss materials which, once combined, achieve high noise reduction.

Involved are at least two basic factors: transmission loss and noise reduction.

Transmission loss is the measure of a material's ability to muffle or block the transmission of sound, while noise reduction is the measure of installed efficiency of one or more high transmission-loss materials.

Noise reduction—the ultimate aim—is keyed to "ear proof" . . . how much noise does a material or a combination of materials really block? And does this muting apply to all audible frequencies and loudnesses, or does the material, or combination of materials, "leak" some frequencies while muffling others?

Explains one engineer, "transmission loss concerns materials as such . . . which, in themselves, transmit the least amount of noise at various frequencies (say from 100 to 10,000 cps) and at varying degrees of loudness. Noise reduction is a corollary . . . a measure of the in-use efficiency of the materials.

Test Room for Materials

To test various materials for their inherent transmission loss, Convair engineers built two adjacent rooms, one a reverberant "source room" (fitted with loudspeakers), the other an echo-free "silent room" rigged with pickup microphones placed at various distances from a 30-in. by 40-in. opening in the common wall between the two rooms. Across this opening were placed the test materials—aluminum, glass fiber blankets and the like. The object: to measure loss transmission through the materials, and, at the same time, determine the noise reduction within the "quiet" room.

Findings throw new light on plant noise . . . and how to stifle it.

Damping tape, multiple layers of it, effectively damps vibration, one of the most difficult "noises" to control in any plant.

The aluminum tape, however, has but small noise reduction effect at very low frequencies (below

Fig. 3. Application of multiple layers of tape makes a thin panel that cuts vibration noise as well as noise above 40 cps.

Fig. 4. Glass blanketing and tape reduce noise level 75 to 80 per cent. Overlapped blankets help avoid noise leakage.

400 cps). Above about 400 cps, the tape becomes significantly more effective in simple material loss transmission tests, with the tape increasing in effectiveness at a rate of roughly 1 to 1.5 db per octave.

Thickness of the fiberglass blankets is not as critical as most plant men believe, especially in blocking high frequency noise. For example, increasing blanket thickness from 3 in. to 4 in. resulted in not more than a 3 db increase in transmission loss in the high frequency range.

Performance depends in a large measure on precisely how a wall is constructed. The method by which blankets are mated to the structure and tied one to another is critical. Just as critical is elimination of "leakage" paths through a sandwich wall. Thus, belt frames were wrapped in glass fiber instead of being left exposed.

Convair's put-together technique for "sound panels":

Outer skin and interior panels are joined via the belt frames which, in turn, are separated from the inner panel by rubber grommets which isolate vibration and aid in over-all sound attenuation.

Pure aluminum damping tape is built up, layer by layer until, in some cases, its mass adds 30 per cent to the total weight of a panel. How much tape is used and how many layers depend on the panel section's proximity to exterior noise, and to the frequency and loudness of the noise. Generally, the higher the frequency and louder, the more taped layers.

Glass blankets are cased in nonporous, fire-resistant nylon jackets to protect against moisture. Blankets are tailored to fit snugly between the belt frames and around windows and openings. Attached to one edge of each blanket section is a flexible fiberglass flange which is wrapped around the belt frames and held in place by a metal clip. This flange, in turn, holds the adjoining blanket edge in place while the opposite flange wraps around the following belt frames, and so on. In practice, the flange-like glass material isolates the belt frames from the interior panel, swaddling them in sound-deadening material. Between blankets and interior-exterior panels are ¾-in. air spaces. **End**

HOW TO DESIGN

PNEUMATIC-HYDRAULIC ACTUATION SYSTEMS

TENTH IN A SERIES OF ARTICLES

Part X. Designing pneumatic systems for automatic movement of the work and the tool

IN THIS DAY of automation we often hear the remark that machine operators must be technicians in order to operate a machine. This may be the case in some instances but those who must really be the technicians are the maintenance people who must repair the machines and keep them in operation. In many instances the operator has little to do other than make certain that the material is flowing into and out of the machine satisfactorily. On some of the more elaborate devices the handling of the material is taken care of automatically.

The maintenance man must be able to analyze trouble when it develops and cure it as quickly as possible. The circuit designer can be a big help to the maintenance man by designing a circuit which can easily be traced and the machine builder should place the components so that they are readily accessible for servicing.

Often one finds a machine that is built so that it is nearly impossible to service. For example the piping may be such that it is necessary to remove two or three components in order to get to the defective one as shown in Fig. 1. These instances must be avoided. The inauguration of subplate mounted valves has been a big help to maintenance personnel.

In providing the simplest form of movements in an automation process we generally find it necessary to move the workpiece and the tool, either at the same time or in some sequence. In Fig. 2 quick exhaust valves are used in conjunction with double-acting cylinders. This enables us to rid the exhaust side of the cylinder of trapped air and greatly increase the speed of the stroke. Size of piping can also be reduced somewhat. Such setups are often used where hammerlike blows must occur or where the piston rod must rapidly extend and retract in order to get out of the way of a fast-acting movement on a machine.

Figure 2 shows a conveyor which may be moved by an electric motor with a gear reducer, a pneumatic motor or an hydraulic motor. The workpieces are contained in carriers on the conveyor and work is performed at a rapid rate. The workpiece is moved to station A in the carrier where a pin on the carrier protrudes when the workpiece is present. This pin momentarily trips toggle actuator of valve A which directs pilot pressure to connection X of valve B. This shifts spool and air pressure is directed through quick exhaust valve C by moving in port 1 and out port 2 and then into blind end of cylinder D.

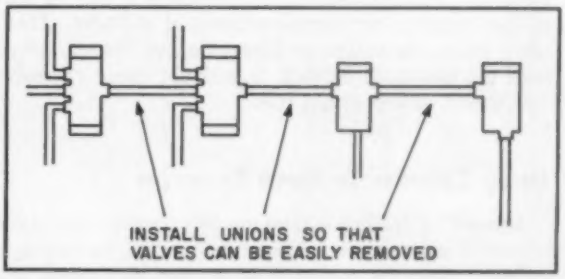


Fig. 1. Design piping system for easy removal of units.

Piston rod carrying stamp decends rapidly as air is exhausted out of port 3 of quick exhaust valve E. As workpiece is struck, cam on tailrod of cylinder D contacts actuator of pilot valve F and pilot pressure is directed to connection Y of valve B. Spool is shifted and

air pressure is directed to quick exhaust valve E. Here it passes in port 1 and out port 2 to rod end of cylinder and piston retracts rapidly as air is exhausted out port 3 of valve C.

When workpiece reaches the loosening station B, action similar to that at station A takes place. A hammerlike blow is required to loosen the piece in the carrier. As the workpiece reaches station C it drops by gravity onto another conveyor and is moved to the storage area.

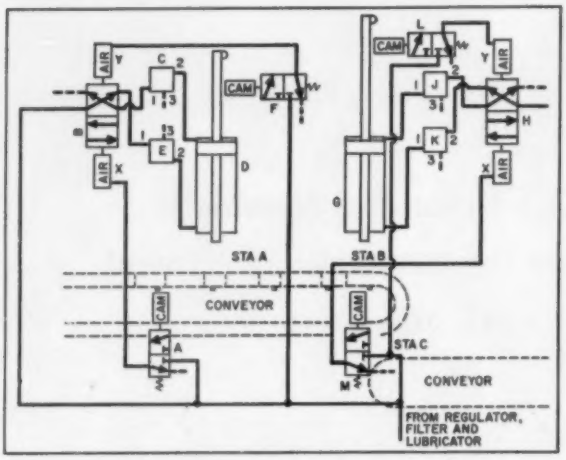


Fig. 2. Quick exhaust valves with double-acting cylinders.

The speed at which the conveyor can operate depends upon how quickly the tools fastened on the end of the cylinder piston rods can make contact with the workpiece and then be retracted. At station A it may be well to use a pivot- or trunnion-mounted cylinder. Then, when the stamp makes an indentation on the workpiece with the conveyor moving, it will not cause excessive side thrust on the piston rod.

Using Cylinder To Move Conveyor

Instead of having a continuously moving conveyor we could accomplish the same end results by having a cylinder move the conveyor in definite increments and interlock the three cylinders as shown in Fig. 3. As the material fills the carrier on the conveyor, limit switch LS-1 is actuated by a spring-loaded pin protruding from the bottom or side of the container. This causes solenoid S-1 of four-way valve A to be energized and spool is shifted, directing air pressure to blind end of cylinder B and piston rod B advances, picking up advancing mechanism and moving conveyor and carriers. LS-2, LS-4 and LS-6 are momentarily contacted. When LS-2 is contacted solenoid S-2 is energized, shifting spool A, then air pressure is directed to rod end of cylinder B and piston retracts, making ready for next movement of conveyor.

LS-4 energizes solenoid S-3 and spool D is shifted, directing air pressure to blind end of cylinder C and piston rapidly advances tool to workpiece. As it is contacted, LS-3 is tripped, energizing solenoid S-4 and spool D is shifted to original position and air pressure is directed to rod end of C. C rapidly retracts since air is quickly exhausted through valve H.

At the same time LS-6 has been tripped and S-5 is energized, shifting spool F and air pressure is directed to blind end of cylinder E. Piston rapidly advances and tool performs work. LS-5 is tripped and S-6 is energized, shifting spool F to original position and piston E is retracted. Piston B cannot advance again until pistons C and E are retracted as LS-8, LS-7 and LS-1 are hooked up in a series.

In some instances it may be better to eliminate LS-3 and LS-5 and in their place insert pressure switches. But in installations where there is any possibility of the pistons of the cylinders being stalled prematurely on the outstroke, pressure switches would not suffice. The system should be made as foolproof as possible.

To further automate the system, an automatic carrier filler device could be installed.

In Fig. 4 we have a circuit which is used for handling material where both the workpiece and tool are moved automatically. Workpieces are hopper fed into a loading station of an index table and limit switch LS-1 is tripped, energizing solenoid S-1 of valve D. Spool of valve is shifted, directing air pressure to blind end of indexing cylinder A and piston advances causing table to index one station.

LS-2 is then contacted which energizes solenoid S-2 and air pressure is directed to rod end of A and piston retracts. Table does not move since it is designed to move only in one direction of the piston rod movement.

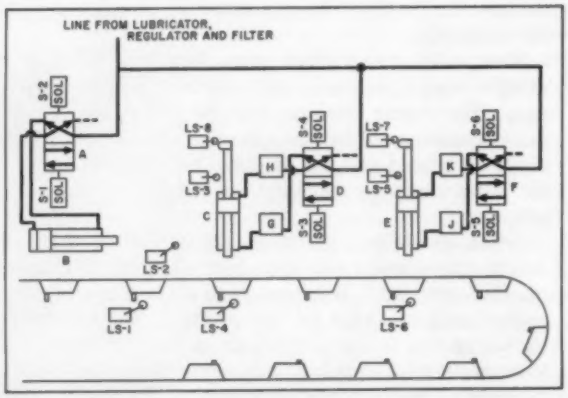


Fig. 3. Control conveyor movement by interlocking cylinders.

In place of cylinder A an air motor drive through a gear reducer might be used.

After table has been indexed one station, LS-3 is momentarily contacted and solenoid S-1 of valve E is energized, directing air pressure to blind end of cylinder B and the piston advances carrying the pickup cylinder C. When B reaches end of stroke, LS-4 is tripped and

Volume of air required for a certain bore and stroke cylinder.

Piston Dia (in.)	Length of Stroke 1 in.	3 in.	6 in.	9 in.	12 in.
	Volume of Air Required (in cubic feet)				
2	0.0018	0.0054	0.0109	0.0163	0.0218
3	0.0040	0.0123	0.0246	0.0368	0.049
4	0.0072	0.0218	0.0435	0.0653	0.087
4½	0.0092	0.0276	0.0552	0.0828	0.1105
5	0.0114	0.0341	0.0681	0.1023	0.136
6	0.0164	0.0492	0.0983	0.147	0.197
7	0.0223	0.067	0.1336	0.200	0.268

solenoid S-1 of F and solenoid S-1 of H are energized. Spool F is shifted, directing air pressure to blind end of C and piston C advances. At the same time vacuum is started when H opens and, as soon as pickup head meets the workpiece, the vacuum is ready to pick it up.

Pressure builds up in cylinder C and contacts of pressure switch PS-1 close, causing S-2 to be momentarily energized. This causes pressure to be directed to rod end of C and piston C retracts, picking up workpiece.

As piston C approaches retracted position, limit switch LS-5 is contacted, causing solenoid S-2 of E to be energized and air pressure is directed to rod end of B and B retracts. As B reaches retracted position, the relay which holds S-1 of H energized drops out. Vacuum is then cut off and passage to pickup head is opened to atmosphere and workpiece is released into a cleaning tank. By a slight addition, the pickup head could be lowered before it releases the workpiece. Piston B must be in retracted position before table can be indexed.

Provisions Necessary for Such Systems

In setting up such a system, provisions must be made so that each sequence of the operation will be interlocked. Keep the system as fail safe as possible. In place of limit switches a timing circuit may be used to actuate the controls. In certain applications, where hazardous locations are concerned, it may be well to design a non-electric circuit although it may be considerably more expensive. Pilot- or cam-operated valves would be used.

It should be remembered that in order to make pneumatic systems economical to operate there must be a sufficient volume of air available to allow the system to operate at the speeds required. Too often a system is installed without giving thought to how much compressed air will be required to do the job. To give the installers some idea as to the volume of air required for a certain bore and stroke cylinder, refer to the table for the outward movement of the piston. The inward movement will be slightly less due to the volume of the piston rod.

If a double-acting cylinder with a 2-in. bore by a 12-in. stroke is to complete a cycle in two seconds, then approximately 0.0436 (0.0218x2) cu ft of compressed air must be available to be dispersed in less than the two second period since time must be allowed for a valve to shift. Often there is confusion between a cycle and a stroke of a double acting cylinder. A cycle is considered to be the movement of the piston forward and its return while the stroke is considered to be only the movement in one direction.

In Fig. 5 we make use of a combination of air-oil cylinders to perform the tool cycle and an air cylinder to do the transferring and holding. The workpiece is transferred from the magazine as piston A is retracted. Workpiece contacts limit switch LS-1 which energizes solenoid S-1 of valve F and valve spool is shifted, directing air pressure to blind end of transfer cylinder A and piston moves workpiece into work station.

LS-2 is then momentarily contacted and solenoid S-4 of valve G is energized and air pressure is directed to blind end of clamp cylinder B and workpiece is securely clamped. LS-3 is momentarily contacted and S-6 of valve H is energized and air pressure is directed to blind end of air-hydraulic drill cylinder C. This cylinder actuates a multiple spindle drill head and the speed of approach to the workpiece is limited by flow control SS.

If a fast approach and controlled feed is desired, cam-operated flow control SK is used and is installed as shown in dotted-in section. In some operations it is even desirable to use a skip feed arrangement. The depth of drilling is controlled by LS-4 and can be changed by moving LS-4 or the tripping cam.

As the piston of cylinder C approaches the retracted

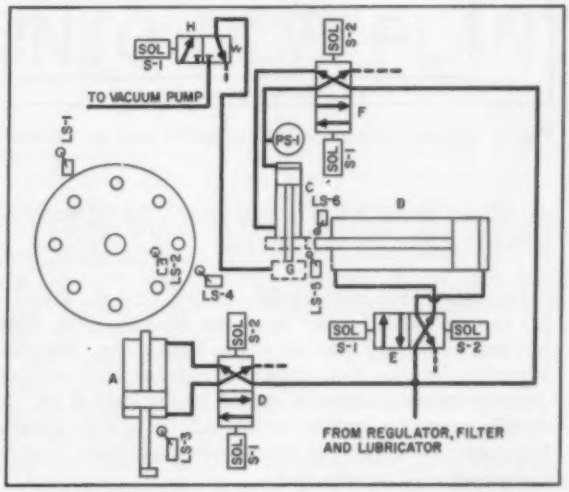


Fig. 4. Circuit operating sequences should be interlocked.

position, LS-5 is momentarily tripped, energizing solenoid S-8 of valve J and air pressure is directed to the blind end of the double-acting, air-oil intensifier D. This directs oil pressure to two small single-acting, spring-return stamping cylinders which are used due to the limited amount of available space.

As the stamping is performed pressure builds up in the oil chamber and pressure switch PS-1 is actuated, energizing solenoid S-7 of valve J and air pressure is directed to rod end D and piston retracts, releasing stamp cylinders R and P. As piston D completes re-

traction, LS-6 is tripped, energizing S-3 of valve G. This causes air pressure to be directed to rod end of clamp cylinder B and piston retracts, releasing workpiece. LS-7 is contacted and S-9 is energized, opening door and dropping workpiece onto conveyor. As workpiece drops onto conveyor LS-8 is contacted, energizing S-10 and S-2. Door closes and piston of A retracts and is ready for next workpiece.

The ratio between the area of the pistons in cylinder D will govern the amount of intensified pressure that is available to work in the stamping cylinders R and P. For example, if the air end of the cylinder has an area of 100 sq in. and is operated at 90 psi and the area of

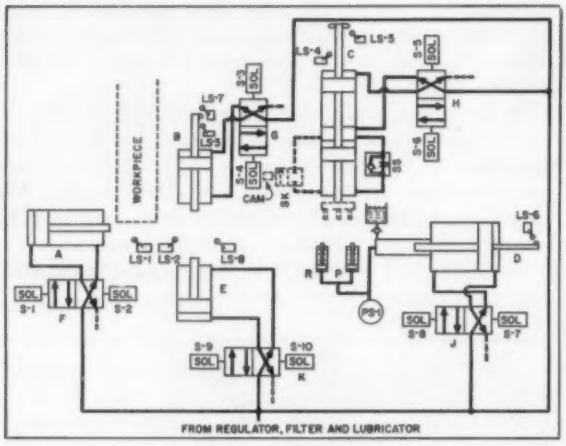


Fig. 5. Circuit combines air-oil cylinders and air cylinder.

the oil end piston is two square inches, the oil pressure would be $\frac{100 \times 90}{2}$ or 4500 psi.

One advantage of using this setup is that the intensifier can be located away from the working area. This is often necessary due to space limitations. Another advantage is that high pressures can be used without creating excessive heat as would be the case if an hydraulic pumping system were used. It is also usually less costly to install the intensifier rather than a complete hydraulic power unit.

Throttling Valves May Be Necessary

If the intensifier setup is used for pressing inserts into the workpiece, it would be desirable to install throttling valves to control the movement of the rams. The throttling valves could be installed either on the air side or hydraulic side of the intensifier.

In Fig. 5 all work must be completed before piston rod of cylinder A retracts otherwise there will be a jam in the system. It may be desirable to insert a flow control in the line between rod end of cylinder A and valve F in order to slow the advance of the piston rod. The air-hydraulic cylinder speed can be infinitely adjusted for various densities of materials which are being worked.

To move the workpiece from one station to another, an actuator can be used successfully as shown in Fig. 6. Here, the workpieces move down a conveyor to station 1. When the workpiece is in place at station 1, limit switch LS-1 is tripped and S-5 is energized. Air pressure is directed to blind end of cylinder B and piston descends. Magnets on ends of arms contact workpieces at stations 1, 2 and 3. As piston B reaches extent of stroke, LS-2 is momentarily contacted, energizing S-4 of valve F and S-8 of valve H and hydraulic pressure is directed to the blind ends of cylinders C and D, respectively. Pistons C and D advance and the work is performed.

Pressure builds up, closing contacts of pressure switches PS-1 and PS-2 which cause solenoids S-3 and S-7 to be energized and pistons C and D retract. When pistons C and D are retracted, LS-3 and LS-4 are tripped, energizing magnets. S-6 is also energized, di-

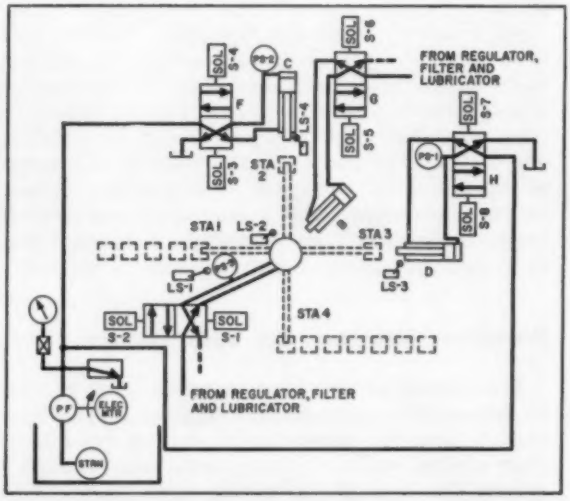


Fig. 6. Actuator moves workpiece from station to station.

recting air pressure to rod end of B and piston B retracts. S-1 is energized and workpieces are indexed 90 degrees. PS-3 contacts close, and solenoid S-2 is energized. Actuator then retracts but indexing mechanism does not, since it only operates in one direction. As actuator retracts, S-5 is energized and piston B again descends. When the workpiece is in the down position at station 4 the magnet releases it onto the conveyor.

With such a setup high cycling can be accomplished. If more stations are desired, this can be done by using an actuator with a smaller range of rotation. An air or vacuum-operated pickup head can also be used in place of the magnets. Many transfer, tool cycle and transfer applications can be readily worked out for automating an operation.

In the next installment we will discuss some automatic testing methods. **End, Part X**

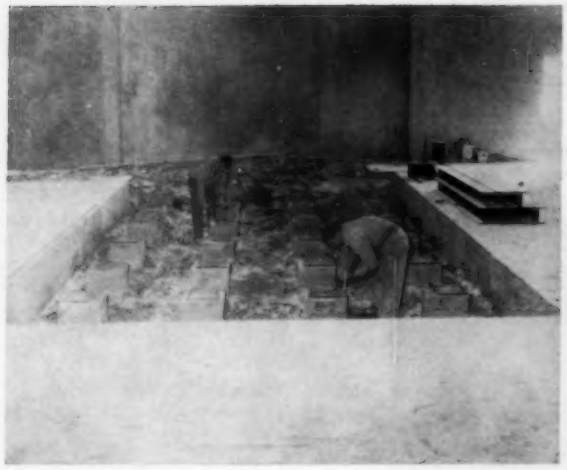


Fig. 1, upper left. Concrete piers were poured and steel plates attached to pier tops. Next step—installing H-beams.

Fig. 2, above. Lugs on each side of H-beam attach it to steel plates. Set screws were used for the final leveling.

SEVEN SMART IDEAS FOR EFFICIENCY DESIGNED INTO NEW PLANT

A "TOOLING ISLAND" is one of several unusual features designed into the new plant of Airline Welding and Engineering Company, Gardena, Calif., which help keep production efficient. The island is used principally for setting up and initial alignment of heavy frame structures for automatic butt welders and roll planishers.

Before moving to this new plant, the company operated in three separate, make-shift buildings. "In the old plant," says Byron R. Russell, owner of the company, "we had to shim, level, work and worry during frame setup and alignment. Now we merely lag the frame members to the H-beams in the tooling island, then proceed with fabrication."

Construction of the island, which is level to within ± 0.015 in., started with making a pit 3 ft deep, 20 ft wide and 36 ft long. The walls were solidly lined with 1-in. by 2-in. felt-faced boards to separate and insulate the tooling island from the main plant floor. Next cement piers were poured at regular intervals to support the four 36-ft long, 8-in. H-beams that would provide the tooling island's basic leveling structure. See Fig. 1. Steel plates tapped for set screws and lug bolts were installed on the top of each pier, see also Fig. 1. The H-beams, running the length of the island, were then centered on these steel plates.

Next, eight lugs on each steel plate, four on each side of the H-beam, were installed with half-inch bolts to hold the H-beam securely against the steel plate. Then set screws were driven through the tapped holes in the steel plate to be used for final leveling, Fig. 2.

After the H-beams were in place and leveled, they were tied together by sub-floor reinforcing members. Then approximately eight inches of crushed rock was leveled on the floor of the pit, see Fig. 3. Finally, the pit was filled by pouring solid concrete around the piers, the steel plates, the cross-sectional reinforcing members, and the H-beams.

A final checkout with a transit (and it has been checked several times since completion) showed an over-all levelness between any two points of the four H-beam surfaces falling between the plus-or-minus 0.015 in. tolerance mentioned, see Fig. 4.

Better Electrical Service

A second interesting innovation was made in wiring the plant for electrical service to the welding heads used on the numerous precision automatic butt and circumferential welders employed for in-plant production work.

In the old three-building arrangement, all machines in each building were on a single circuit. These included metal brakes, shears, and big lathes. When a big motor was accidentally turned on while a precision welding head was in the process of running a weld bead in thin gage material, the current in-

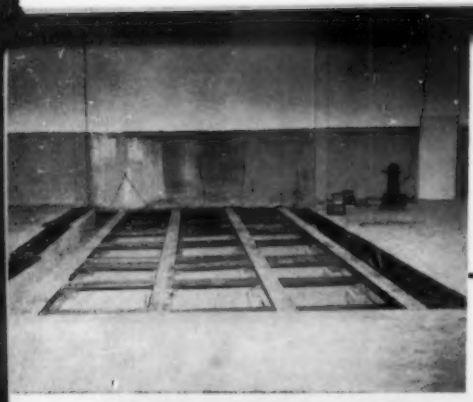
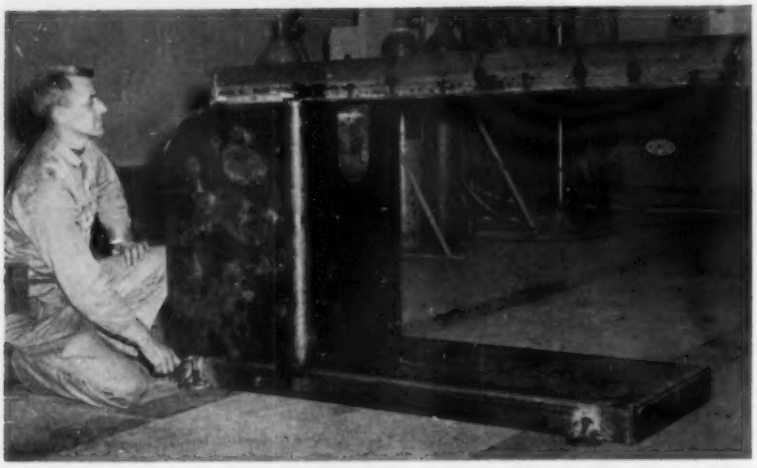


Fig. 3. H-beams and subfloor steel structure are now ready for concrete.

Fig. 4. Steel frame of automatic butt welder spanning H-beams, is trued up.



SEVEN SMART IDEAS FOR EFFICIENCY

terruption would momentarily break the arc. This made an expensive weld repair job necessary.

In the new plant, five separate plant areas are fed directly from five different circuit breakers on the control panel. Each circuit will deliver 200 amperes at 480 volts. The amount of power available, and careful division of the equipment in use between the five circuits, minimizes the possibility that turning on any one piece of equipment will cause enough current interruption to affect a welding arc. The only thing that could cause arc failure or momentary breakage would be power failure throughout the area in which the plant is located.

The control panel for the plant power supply is mounted on a platform near the roof to conserve floor space. The circuit breakers may be reached from the plant floor. Only lights, hand tools and office machines are operated at 110 volts. The rest of the plant equipment operates on 480 volts, with a total of 2000 amperes available. Considerable savings accrue from using power at this voltage. Outlets for hand power tools are located at 20-ft intervals along each plant wall and down the center of the building.

Vibration Isolation

To prevent plant vibration from affecting the precision thin gage butt welding work always in progress, each of the larger machines which can cause vibration is mounted on its own individual machine isolation island in the plant floor. These islands do not extend the full dimensions of the machine, but were installed in pairs for each machine with an island for each two machine mounting legs. The depth of the paired islands was varied according to the weight of the machine they were intended to support, and varies downward to five feet.

Here again, felt-faced 1-in. boards were used to line the walls of the island pits to provide shock insulation between the island and the main plant floor. And here also crushed rock was used to cover the bottom of each pit to a depth of approximately 8 inches. The rest of the pit was filled with concrete.

A steel plate is anchored three feet deep in each concrete filling. A 2-in. steel tube extends upward to floor level from a tapped bolt hole in the center of each plate. Three-foot long bolts extending downward through the tube are used to attach the machine legs to the island. The 2-in. tube provides leeway for aligning the mounting holes in the machine leg with the tapped holes in the steel plate anchor.

Providing anchor bolt leeway was much easier than trying to align solidly anchored bolts so that they would match machine mounting holes during subsequent machine installation. No vibration can be detected even when the descending die meets heavy material and begins to form it.

Argon Gas Storage

To eliminate floor clutter, time wasted in handling gas bottles, and the cost of demurrage on gas bottles, all argon gas used in shielded arc welding processes is stored outside the plant and piped in to the various points of usage. The storage facilities, located in a small fenced area in the parking lot, consist of two banks of 26 bottles of argon gas, or 52 gas bottles in all, each with a capacity of 320 cu ft of argon gas when full. The bottles in each bank are interconnected so that they form a common supply. When the gas pressure in one bank drops to 200 psi, the other bank is valved into operation and the depleted bank is refilled.

This outside gas storage has several monetary and operating advantages in addition to those mentioned above. In the old three-building plant setup, where bottled argon was kept on the floor, all the gas in each bottle was used before it was replaced with a new bottle. When the gas pressure in a bottle is reduced to atmospheric pressure, the danger of contamination is greatly increased.

More than once in the other plant setup, it was found that contaminated argon was being used as the bottle neared depletion. This resulted in badly oxidized weld beads which had to be repaired or rejected. In the new plant setup, where bottle gas pressure is not allowed to drop below 200 psi, this danger of atmospheric contamina-

tion is eliminated. And, because the storage facilities are a permanent installation with no bottle exchange no penalty is involved in not using all the gas a bottle contains.

Monetary savings are realized because the storage facilities are refilled from a tank truck containing liquid argon. When the gas is purchased in this form, it runs from one to three cents cheaper per cubic foot than when purchased in bottle form. As the bottled gas costs about 10 cents per cubic foot, this means a percentage saving of from 10 to 30 per cent on gas costs, dependent upon the amount being used. Oxygen, helium, and acetylene, all much lesser used gases than argon, are still purchased in bottle form and stored in small wall bays adjacent to the areas of their use.

Three MH Ideas

Handling equipment too, has been designed to facilitate work in different categories. One such piece of equipment helps with the many interchangeable dies used in the shop's big press brake. These dies are stored on a roller-topped table at one end of the press brake. The table is the same height as the press bed, and is mounted on V-shaped casters which run on inverted V-shaped tracks floor-mounted parallel to the end of the press, see Fig. 5.

When a die change is necessary, the die in the brake is merely loosened, then pulled out and on to the roller-topped table. The table itself is then shuttled forward or backward on its V-shaped track until the die required is exactly opposite its bed in the press brake. It is then an easy operation to slide the heavy die from its place on the roller-topped table into position in the press brake.

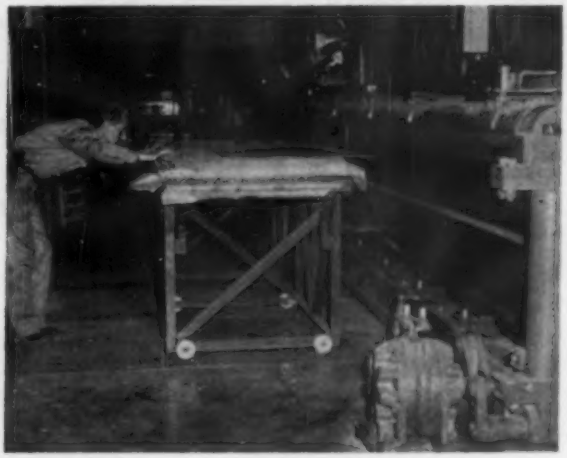
A second somewhat similar device is used for handling the numerous heavy tubular welding mandrels used in the automatic butt seam welders. These mandrels are stored in A-frame racks on a castered cart as shown in Fig. 6. When a mandrel change is necessary, the A-frame rack is pushed into position at the mandrel insertion end of the butt welder. The mandrel in the welder is then slid out onto a pair of the A-frame brackets. If a very heavy mandrel is being installed, it is picked up from its A-frame brackets by a hand-pushed small lift truck and adjusted to machining mounting level. It is then slid from the forks on the lift truck directly into the machine.

A final handling innovation is used in conjunction with the larger automatic butt seam welders. Here again handling tables, seen in Fig. 6, one on each side of the welder, are equipped with V-shaped casters. These casters run on inverted V-shaped track which is not permanently mounted to the floor, but which can be moved about by hand as desired. Thus the same track sections can be used with different machines and only when required. But with the track in place and the sheet stock to be butt welded positioned on each of the tables, it is an easy operation to wheel the tables inward and bring the sheet edges together in precise alignment over the welding mandrel. It would be almost impossible to handle the huge sheets of heavy material with precision by any other method. **End**

Fig. 5. Casters and rails running parallel to end of press brake make it easy to align dies for insertion into die bed.

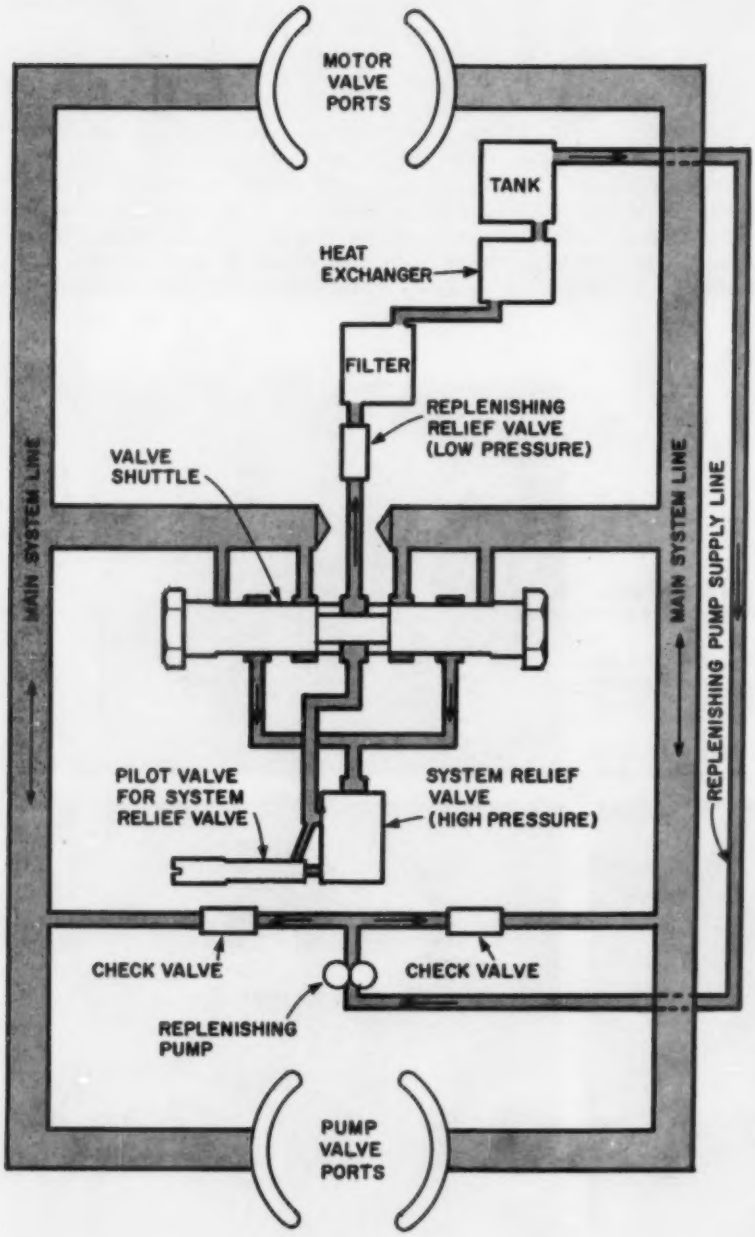
Fig. 6. Portable A frame carrying welding mandrels, can be moved into position beside welding machine. Die is removed from frame, then lifted to correct height by small lift truck.

Fig. 7. Table on portable rails is used to feed sheet steel into seam welder. Similar table is used on opposite side.



HYDROSTATIC TRANSMISSION PROVIDES HIGH TORQUE AT IDLE SPEED

By C. O. WEISENBACH, Senior Project Engineer, The New York Air Brake Co., Watertown, New York



THE TRANSMISSION which we have developed is of the split type having a separate pump and motor. It was originally planned for off-the-road vehicles, but it can be used in any application where it meets the torque and speed requirements.

After having established the general specifications for the pump and motor, it was necessary to plan a workable hydraulic system to determine what components other than the pump and motor would be required.

The system which we decided upon is illustrated in Figure 1. It operates as follows:

When the pump cam is moved from neutral, oil flows from the pump to the motor through the main system lines and thus causes the motor to rotate. The oil being discharged by the motor is returned directly to the pump inlet. If the pump cam is moved from neutral in the opposite direction, then the motor will rotate in the opposite direction.

A small gerotor pump is used to supply oil to the system to make up for leakage and keep a tightly closed system. The discharge of the gerotor pump passes through one of two check valves to whichever side of the system is low pressure.

In order to maintain the low pressure side of the system at a constant pressure and relieve the excess oil supplied by the gerotor pump, a low pressure relief valve is incorporated into the system.

Fig. 1. Schematic concept of the basic hydraulic system. Fluid flows through a shuttle valve to pressure relief valves.

Editor's Note: A dramatic demonstration of the effectiveness of this particular hydrostatic transmission concept was witnessed by E. B. Skubik, Engineering Editor of Plant Engineering. A standard industrial lift truck equipped with a prototype transmission was put through some rugged performance antics.

It climbed and descended a nine per cent slope, travelled through cinders, reversed directions rapidly and smoothly, eased over an obstacle and even raced another vehicle. While negotiating the grade the engine was in an idle setting and the vehicle was carrying a load of about 3000 lb.

To control the direction of travel of the vehicle requires the positioning of a hand lever or a foot pedal. The latter overrides the lever but is not considered a brake. Its function, is that of the manual lever, to control the positioning of a pump cam. Vehicle braking is accomplished by simply placing the control lever in the neutral position or pushing the pedal until the cam reaches the zero angle.

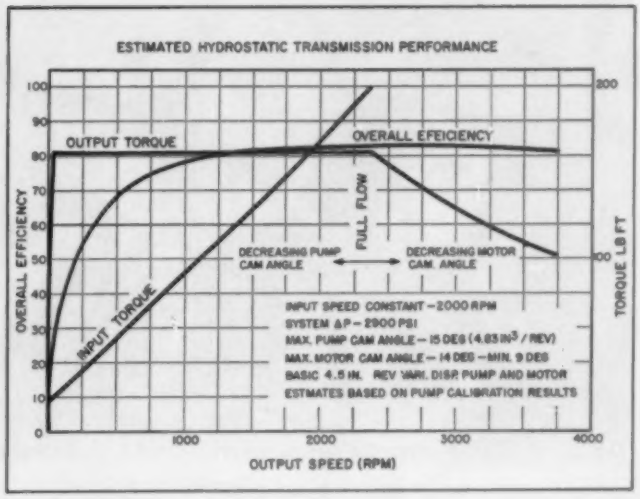

ESTIMATED HYDROSTATIC TRANSMISSION PERFORMANCE
OUTPUT TORQUE
OVERALL EFFICIENCY
FULL FLOW
DECREASING PUMP CAM ANGLE
DECREASING MOTOR CAM ANGLE
INPUT TORQUE
INPUT SPEED CONSTANT – 2000 RPM
SYSTEM ΔP – 2900 PSI
MAX. PUMP CAM ANGLE – 15 DEG (4.83 IN³ / REV)
MAX. MOTOR CAM ANGLE – 14 DEG – MIN. 9 DEG
BASIC 4.5 IN. REV VARI. DISP. PUMP AND MOTOR
ESTIMATES BASED ON PUMP CALIBRATION RESULTS
OVERALL EFFICIENCY
TORQUE LB FT
OUTPUT SPEED (RPM)

Fig. 2. Here is shown the over-all efficiency of the transmission plotted against output speed. Note high output torque at low rpm.

A pilot-operated high pressure relief valve is used to protect the system from oversurges or extremely high starting pressures.

A pressure-actuated shuttle valve is used to direct both high and low pressure oil to their respective relief valves. It operates in the following manner:

When one line is high pressure, the shuttle valve is moved toward the low pressure side. This ports high pressure oil to the high pressure relief valve and ports the low pressure side to the low pressure relief valve. It also ports the discharge from the high pressure relief valve to the low pressure side of the system.

There are several advantages to this system:

1. Oil is constantly being removed from the system through the low pressure relief valve for cooling and filtering. This is particularly useful in systems having short lines and transmitting high horsepower.
2. The heat exchanger and filter can be of the low pressure type.
3. The amount of cooling oil can be varied from one installation to another.

The design parameters for the industrial pump were established from previous development work done on the aircraft overcenter pump and motor. Since the industrial pump was approximately three times as large as the aircraft pump it was an excellent opportunity to prove the parameters for a large unit.

An example of one of these parameters is illustrated in Figure 2. We were able to calculate the maximum allowable pressure for different speeds and cam angles based on piston seizure with steel pistons running in a steel block.

Inasmuch as weight was no particular problem to us, we were able to make certain design changes to simplify the design and reduce cost.

At the present time, two interchangeable controls have been built and tested:

1. Manual control. A control rod is attached to the pump cam through a link. The vehicle control linkage is fastened directly to the manual control. This control provides overcenter travel of the pump cam.

2. Servo control. In order that the pump cam could be actuated by a very small force, a low pressure rotary servo valve was designed. This servo operates on the replenish-pump pressure of approximately 100 psi. It can be easily actuated by the vehicle control. This control provides overcenter travel of the pump cam.

We have furnished prototype transmissions to five manufacturers of non-competitive equipment. **End**

Present plans call for channeling the early production units to the original equipment manufacturing market. Later on, possibly in two years, hydrostatic transmission units based on this design concept should be available to industrial users who are interested in other application possibilities in their plants.

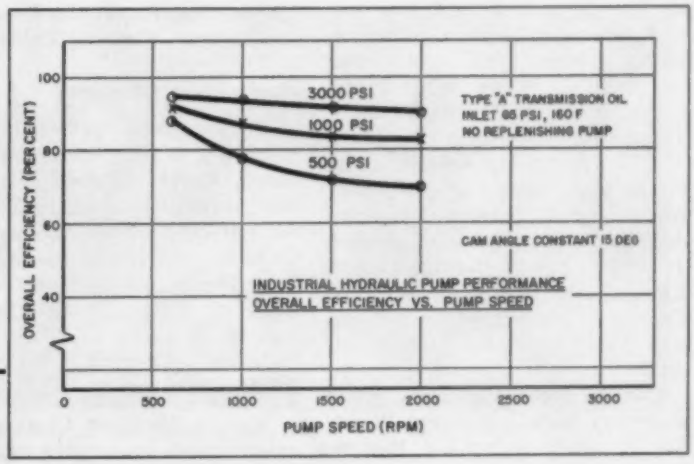


Fig. 3. A few of performance curves which are based on those plotted from lab data. Efficiency varies within 5 per cent in top one.

This group of plant engineers met to organize the AIPE chapter serving industries in California's San Fernando Valley.

NEW AIPE CHAPTERS FORMED

Plant Engineers Active Across the Country

FORMATION of several new chapters has highlighted the activities of the AIPE during recent months.

San Fernando Valley

Newest of these engineering groups is the San Fernando Valley chapter, in California. Attending this organizational meeting of the San Fernando Valley chapter, and shown in photo, were: seated l to r, W. See, Chevrolet Div.; J. M. Weeks, AIPE vice president; H. Monroe, Rocketdyne Div.; B. Crosson, Litton Industries; W. Estelle, Marquardt Aircraft; D. Haught, Atomics International. Second row, l to r, J. Schroyer, Veterans Administration Hospital; A. Lubeley, Anheuser-Busch; W. Harmon, Bendix Corp.; F. Van Dyken, RCA; J. Thompson, Rocketdyne Div.; and W. Fore, North American Aviation, of the Los Angeles chapter. Back row, l to r, A. Johnson, Litton Industries, of Los Angeles chapter; J. Pahlow, Schlitz Brewing Co.; R. Lincoln, Atomics International; W. Crossland, Rocketdyne Div.; and R. Felchle, Thompson-Ramo-Wooldridge.

Officers elected to get the group underway include president Wesley See, Jr., vice president J. L. Pahlow, secretary H. E. Monroe, and treasurer J. A. Schroyer.

And, More Chapters Join

Two more chapters were accepted by the Executive Committee of the Institute at its June meeting; the Southern Connecticut chapter and Northeastern Oklahoma chapter.

Southern Connecticut

Officers for Southern Connecticut include president M. L. Hedberg, Detroit Controls Div., American Standard Co.; vice president John Bayuk, Avco Corp.; S. E. Szemetko, Univac Div., Remington Rand; and J. Sikeritzky, Seamless Rubber Co.

Northeastern Oklahoma

The Northeastern Oklahoma group will be led by president R. L. Scholz, Callery Chemical Co.; first vice president L. J. Milan, Douglas Aircraft Co.; second vice president C. A. Stevens, consultant; secretary R. E. Dunlap, Barelo Wax Co.; and treasurer W. F. Stewart, Spartan Aircraft Co.

Western Michigan

Western Michigan Chapter held an organizational meeting on March 30 in Muskegon, Michigan, and voted to request official affiliation with the AIPE. A constitution and by-laws was approved and the following officers were elected for the coming year: E. Vihstadt, Brunswick Balke Collender Co., president; D. Brautigam, West Michigan Steel Foundry Co., vice president; and J. Cook, Manning, Maxwell and Moore, Shaw Box Crane Div., secretary-treasurer.

The chapter was officially accepted at an AIPE executive committee meeting on April 1.

Massachusetts Route 128

Members of the newly-organized Massachusetts Route 128 Plant Engineers Club applied for affiliation with the AIPE. The application for charter was made by Chapter President Corliss T. Van Horn, of Sylvania Electric Products, Inc., Needham, Mass., and presented to the national treasurer Leo Monty, of Artisan Metal Products Co., Waltham, Mass.

Massachusetts Route 128 Plant Engineers Club meets monthly in Newton, Mass., which is about 15 miles due west of downtown Boston. They were accepted as Chapter No. 52 in the AIPE.

Chapters Share Joint Meetings, Elect Officers

Plant engineers representing five chapters occupied the head table at the joint meeting sponsored by the Boston chapter.

Boston

Activities of this New England chapter have included a tour of the new bronze valve plant of the Walworth Co., and a joint meeting with three other chapters in the Boston area. Those represented at the joint meeting were the Merrimack Valley, North Shore and Route 128 chapters. Also present was Bert Sutphin, president of the Central Connecticut chapter.

One of the highlights of the joint meeting was a birthday celebration held for visiting national president Bill Wallin.

Newly-elected San Francisco chapter officers with retiring president Laursen, left.

San Francisco

At a June joint San Francisco-Santa Clara meeting, newly-elected officers of the San Francisco chapter were announced. Shown in the photo, they are, l to r, M. Laursen, Marchant Calculators Div., past president; H. Wells, McCormick & Co., president; K. Brown, California Ink Co., vice president; C. Hedquist, City of Richmond, secretary; C. Moore, National Lead Co., treasurer; and R. Stevens, San Francisco Naval Shipyard, member-at-large.

St. Louis

J. Moeller, of Emerson Electric Co., was elected to serve as president of the St. Louis Plant Engineering Society, the 26th Chapter of the AIPE. Other newly-elected officers are: C. J. Lukasek, Gaylord Container Div., Crown Zellerbach Corp., vice president; C. J. Hartman, A. O. Smith Corp., secretary; and E. Walsh, Nooter Corp., treasurer.

. . . AND ACROSS THE OCEAN

The London Branch of the Institution of Plant Engineers recently presented a President's Chair to organization headquarters.

Several members of this English organization of plant engineers are members of AIPE, and are indicated in the accompanying photograph. K. F. Dormer (1) 1959-60 President of the Institution, L. R. Leworthy (2), and C. R. Crosse (3) are all members-at-large of the U.S. organization, as well as active members of their own group.

Representatives of the London, England Branch of the IPE group around President's chair donated by Branch. AIPE overseas members are indicated.

Where PRODUCT PURITY is important, protection gets a hand from Alcoa

When protection against contamination from *any* source is vital, take a look at what Alcoa aluminum electrical rigid conduit offers. ¶ It needs *no* protective coating, because it forms its own—an oxide film that repairs itself when damaged. ¶ It's corrosion-resistant—stands up particularly well against acids commonly present in food plants: citric, acetic, tannic. And the compounds that might form when aluminum is used are in most cases *nontoxic*, completely safe. ¶ What else? Aluminum is lightweight (weighs about 1/3 as much as steel), so it's easier to install. Alcoa conduit is also nonmagnetic, nonsparking, and neat appearing. ¶ Consider all costs—initial, installation, maintenance—plus long service and you'll see why Alcoa aluminum conduit is a sound investment. ¶ For full details, contact one of our nearby representatives. Or write to Rome Cable Division of Alcoa, Dept. 5-90, Rome, New York.

◀ ADDED PROTECTION against product contamination is provided by Alcoa aluminum conduit. It needs no protective coating, resists corrosion, and is nontoxic.

ROME CABLE
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New Site Developed for Explosive Forming of Metal Missile Parts

PRODUCTION of a large quantity of aircraft and missile radar antennas will be among the major projects at Ryan Aeronautical Company's new high-energy forming facility on Kearny Mesa, near San Diego, California.

Excavation of three forming pits of varying dimensions has been completed, and concrete slabs have been poured on the 20-acre site. Service structures are being completed.

With two years' background in the use of small explosive charges to form metal parts instantaneously in dies in water-filled pits, Ryan has shaped more than 200 different intricate parts by means of the new process.

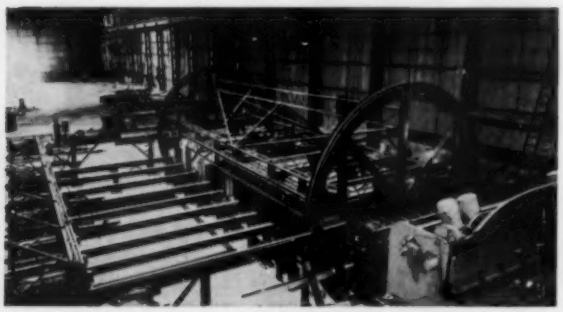
On the strength of favorable results in producing hemispherical missile bulkheads with the high-energy forming techniques, tooling has been started for much larger hemispherical shapes. The hemisphere, one of the most difficult contours to be shaped, is usually produced on shear-forming machines.

The explosive forming facility on Kearny Mesa has a

pit, 25 ft in diameter, capable of handling a 20-ft die, as well as two smaller pits available for the operations when needed.

Automatic Welder Turns Out Varying Sizes of Wire Mesh, Fabric

DELIVERED RECENTLY to Keystone Steel and Wire Co., Peoria, Ill., by National Electric Welding Machines Co., a huge 191-ft-long automatic wire fabric welding machine is expected to produce wire mesh at the rate of 60 tons a day, in widths and patterns for a number of applications ranging from light fencing to heavy duty highway mats.



Reported to be the largest machine of its type ever built, the unit will turn out mesh up to 17 ft wide.

Quick changeover adjustments for wire diameter and spacing are a feature of the machine. Design versatility is such that wire spacing can be controlled in patterns from 2 by 2 in. to 6 or 12 in.

In operation, the machine automatically coils rolls of lighter fabric, or when heavy mats are being produced, it automatically slits, stacks and transfers the mats for bundling.

The welder joins wire from ⅛ to ½ in. in diameter. Eighty electrodes are employed for the work, the power being supplied by 40 transformers, each of 40-kva rating, linked in series.

The machine operates at a speed of 45 strokes per minute adjustable for wire sizes being processed. Shipping economies and compact storage are big dividends paid by a mat turnover (40 ft long, 20 ft in diameter) incorporated into the machine to turn over alternate mats. Transfer tables on sides nest fabric compactly, cutting stack height by one-quarter.

$150,000 Electronic Analog Simulator Trains Power Plant Operators

WORKERS AT THE Enrico Fermi Atomic Power Plant will be extensively trained well in advance of the actual operating date by use of a $150,000 electronic package recently delivered by Holley Carburetor Company, Warren, Michigan. The electronic analog simulator and operator training consoles were designed, engineered and manufactured in the recently formed electro-mechanical division of the company.

With this training facility, power plant operators are given advanced training on plant operating characteristics before the atomic plant is ready for actual operation. Operators will learn both normal and emergency operating procedures before assuming control of the atomic reactor.

The simulator is an electronic working model of the Enrico Fermi sodium-cooled fast breeder reactor, plus components which convert the reactor's nuclear energy into electrical power. Holley engineers, working with several outside atomic power experts, devoted more than three years to the study and development of the simulator and operator training facility.

YARWAY Y news briefs

from **Yarnall-Waring Company,** *Philadelphia 18, Pa.*
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The trap is a No. 48, 2½" size, and is installed on a suction heater connected with an 86,000 barrel tank containing fuel oil at a storage terminal. The operating pressure is 13 psi. At this pressure the trap has a capacity of 25,500 lbs. continuous discharge of condensate per hour.

At operating pressure of 100 psi, the trap's capacity is 62,000 lbs. per hour.

CAPACITY—PLUS

Capacity isn't the whole story on Yarway Series 40 Steam Traps. Like all Yarway Impulse Traps, they offer advantages like quick heat-up, even temperatures, small size, good for all pressures, non-freezing.

Series 40 traps also feature high temperature discharge characteristics, excellent low pressure operation, no airbinding, operation against back pressures up to 40%, and stainless steel construction.

You can get Yarway's latest steam trap Bulletin T-1743, or arrange for a free 60-day trial of a Yarway Impulse Trap, by writing to Yarnall-Waring Company or contacting your local Industrial Distributor.

Yarway ½" No. 40 Impulse Steam Trap (shown actual size). Also available in ¾", 1½", 2" and 2½" sizes.

YARWAY OFFERS IMPULSE STEAM TRAPS FOR THESE SPECIFIC OPERATING CONDITIONS

AVERAGE CONDENSATE LOADS	EXTRA HEAVY CONDENSATE LOADS	LIGHT CONDENSATE LOADS
Series 60	Series 40	No. 30

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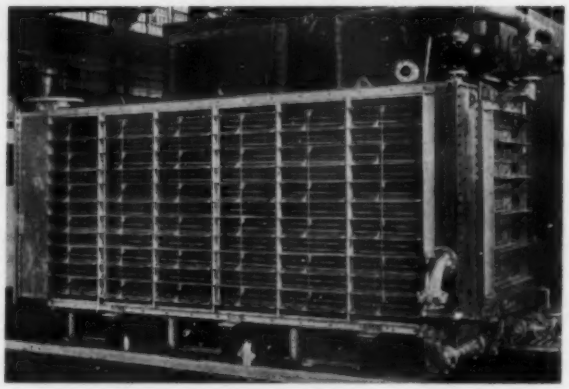
Steam-to-Air Condenser Designed for Remote Nuclear Power Plant Locations

AS PART OF A PORTABLE nuclear power plant being developed by the Nuclear Division of the Martin Company for the Atomic Energy Commission, Westinghouse is building a steam generator, a turbine-generator, switchgear and a unique condenser for the prototype.

The station being developed by Martin will have a gross output of 1250 kw, of which 1000 kw will be available as net electrical energy. Power plant auxiliaries use the balance of the gross. In addition, the reactor and steam generator will provide seven million Btu per hour for space heating.

A portable nuclear power plant has potential application in remote military installations, and the Martin system has been designed to eliminate the problem of providing large volumes of cooling water to a conventional steam condenser. Therefore, a steam-to-air condenser that requires no water will be used. This unique condenser, being built by Westinghouse to operate in temperatures from 125 F to —60 F, measures approximately eight feet wide by eight feet high by 20 feet long.



Requirements for the electrical equipment are stringent because the output will be used to power sensitive electronic apparatus. The 4160-v, 60-cycle, three-phase output of the generator is to be held within plus or minus 0.5 per cent voltage variation.

Submerged—Arc Welding Used on Blast Furnace Bells

A 30-TON STEEL "bell" will soon sound out another major contribution to steelmaking science at U. S. Steel's Geneva Works, near Provo, Utah.

Located near the top of the furnace, a system of dual steel bells holds charged coke, limestone and iron ore before dumping them into the body of the furnace.

Steelmakers have sought to make the bells,—which open and shut some 240 times a day, more resistant to abrasion, corrosion, and operating temperatures varying from 450 to 650 F.

Columbia-Geneva Steel engineers solved the problem by submerged arc welding over 3200 lb of stainless steel in three separate layers to the outer, wear-exposed portion of the bell.

The new hard surfacing process will not only extend the bell's service life but will make possible the renewal of worn out bells.

Portable Clean Room Keeps Critical Welding Operations Dirt-Free

A PORTABLE, EXPANDABLE clean room controls airborne contamination for critical welding operations on heat exchanger equipment at the Walden Plant of American-Standard Industrial Division in Buffalo, New York.

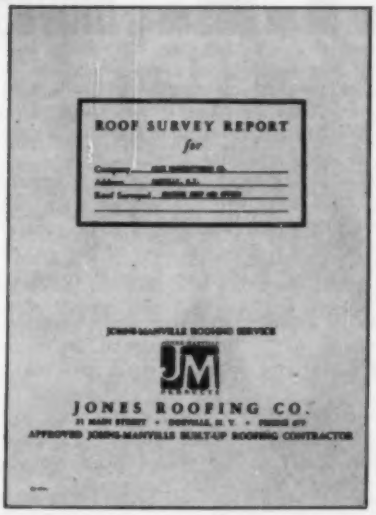
Confronted with the problem of welding various components on heat exchanger equipment tube bundles, which may measure 40 ft or more in length, American-Standard engineers designed a portable clean room that can be expanded to contain tube bundles of virtually any length.

Constructed with hardboard side panels and a heavy-duty polyethylene semicircular top, the room is expandable in six-foot lengths to accommodate the necessary tube bundle length. A fan on the inlet vent draws air through a filter into one end of the room, and another fan at the opposite end forces air out to maintain a continuous flow of contaminant-controlled air.

A special advantage of the portable clean room results from its sectional construction. When the room is not in use, it is easily dismantled and stacked in sections. It requires minimum storage space and permits greater utilization of existing space. When the room is required for another job, it can be erected anywhere in the plant.

These trained eyes can spot future roof trouble

YOUNG ROOFING CO., ST. LOUIS, MO.



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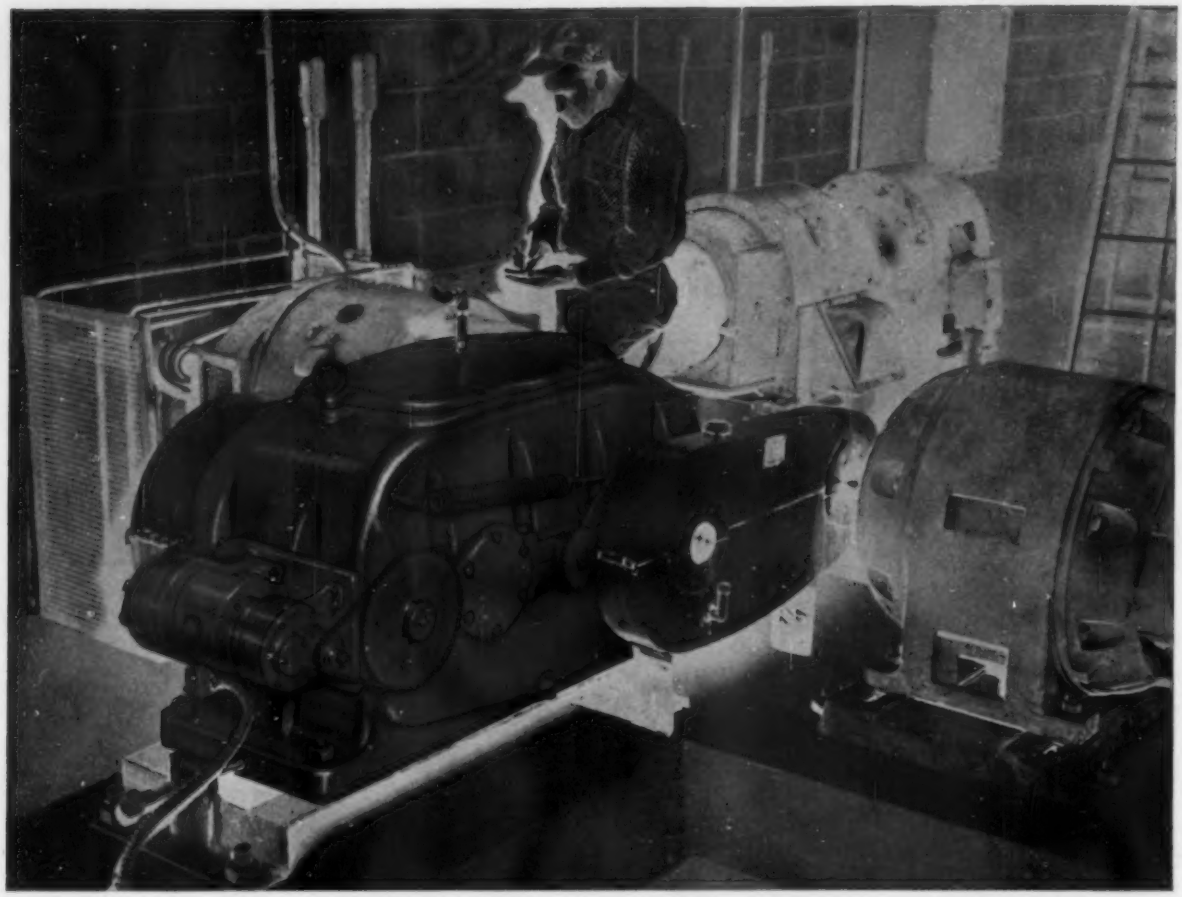


For stepless, slipless, accurate, infinitely variable speed control:

positive P.I.V. VARIABLE SPEED DRIVES

LINK-BELT P.I.V. VARIABLE SPEED DRIVES

UNIQUE in operation, unmatched in accuracy! That's Link-Belt P.I.V.—the *only* chain-driven variable speed drive. Teeth—not tension—permit instant ratio changes with no loss of efficiency, regardless of load conditions.

P.I.V.'s exclusive all-metal, self-tooth-forming chain consists of packs of free-sliding steel slats which serve as teeth. The chain meshes with radially grooved wheels cut to a constant depth toward the wheel periphery. Beveled sides of the grooves offer gripping areas . . . provide a positive, nonslip contact at any speed, under all loads.

Link-Belt P.I.V. drives are available in 8 sizes and 16 standard types, in capacities from ½ to 25 hp—horizontal or vertical housings. Type RS P.I.V. variable speed drive is available in capacities up to 50 hp.

Book 2274 contains the complete P.I.V. story. For your copy, contact your nearest Link-Belt district sales office or authorized stock-carrying distributor. Refer to the yellow pages of your phone directory under Power Transmission Equipment.

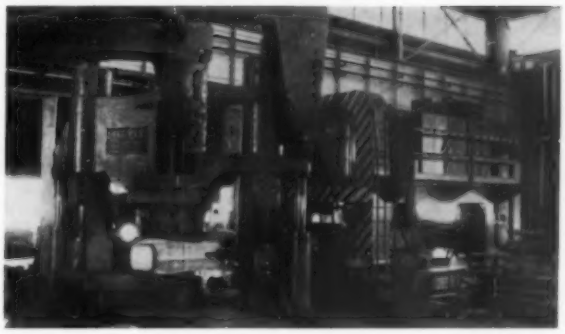
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 19.348

For more facts circle 576 on Reply Card

Radical Size, Radical Design of Forging Press Increases Versatility

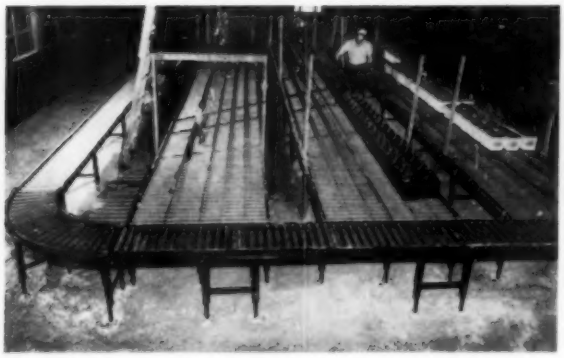
HUGE FORGINGS weighing up to 20,000 lb, in the often complex and hard-to-work tool steels are no more than routine production items on an unique press at the Dunkirk, N. Y. works of Allegheny Ludlum Steel Corp. The 2000-ton general purpose, oil hydraulic forging press, a radical new forging operation, handles ingots of special alloys weighing up to 15 tons—planned additions of larger auxiliary equipment will greatly increase this. Or, it can work small billets six inches square.

Two-column design, as opposed to typical four-column, allows wider feed space for billets and better view for the operator. The inverted features of the press put much of the operating equipment below floor level, freeing valuable floor space around the press. Automatic features permit accurate regulation of the distance the forging die can travel and control the pressure being applied.



Regulation of travel distance assures exacting dimensions of the finished product; pressure control keeps the internal quality uniform. The forging of hot metal refines the internal grain and carbide structure in proportion to the applied pressure.

Plastic Rollers in Conveyor "Stand Off" Acids in Battery Plant



A PVC ROLLER CONVEYOR network—the first of its type—has eliminated sulfuric acid corrosion losses and done away with awkward push-tables along the storage battery line at Scranton Battery Co., Scranton, Pa.

According to Scranton personnel, the 2650 linear-foot Byers roller conveyor system has streamlined the entire operation, from assembly through to charging, refilling of batteries with acid and finishing.

Designed by Scranton Battery in cooperation with A. M. Byers engineers, the conveyor network uses more than 18,600 feet of PVC pipe for rollers and shafting. Rollers are Schedule 40, 1½-in. pipe and vary in length from 8 to 16 in. Special plastic bushings cemented inside the roller ends accommodate the roller axles which are fabricated from Schedule 80, ¼-in. pipe.

Automatic Multiple-Operation Tool Sets Industry Pace

FIRST MAJOR PIECE of equipment to be built to the new Special Machine Tool Standards, a Buhr Economatic, has been completed on schedule and has been delivered to its owner, the American Motors Corporation.

The machine is a lift-and-carry, part-through transfer machine with 58 stations. It was designed to perform 323 precision operations in automatic sequence on cylinder heads for automobiles at American Motors Corporation's plant in Kenosha, Wisconsin.

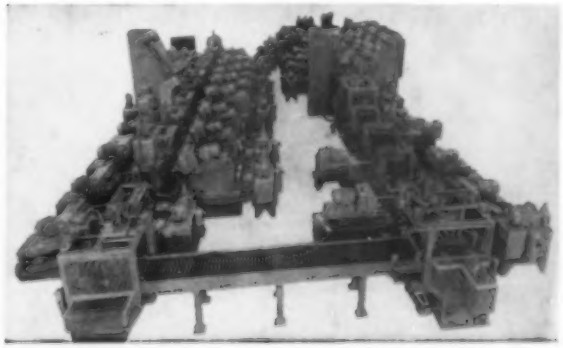
Operations, in addition to rough and finish machining, include probing, sealer application, assembling, pressure testing, rejecting and injecting. The work cycle is 30.0 seconds. Capacity at 100 per cent efficiency is 120 pieces per hour.

In its progress through the machine, the part is rotated through 90 degrees twice and tipped 90 degrees four different times to present appropriate faces to the tooling.

Because it is the first major machine to be built to the Special Machine Tool Standards, the machine (called "Buhr's Baby") is of especial interest to other users and builders of multiple operation machine tools.

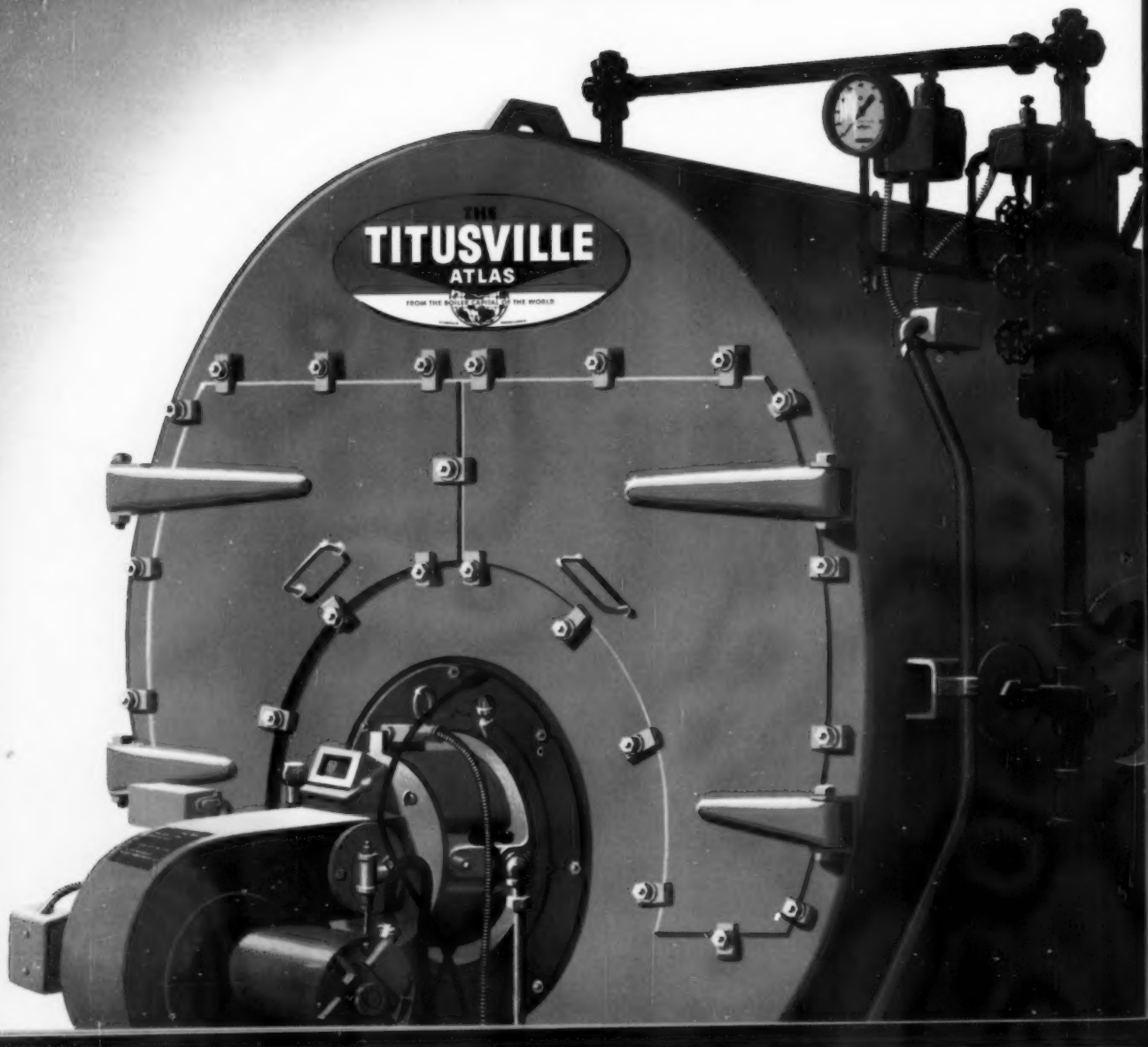
"Buhr's Baby" also introduces basic engineering and design changes in areas not covered by the standards.

Among these innovations is the new hydraulically-operated way type feed unit which is actually a compact power package with all controls panel-mounted directly on the side of the unit. Only three hydraulic lines need be disconnected to move or remove the units. The new units also provide a 60 per cent increase in rate of rapid traverse and a 50 per cent increase in structural strength. Incorporation of a differential circuit reduces oil consumption 50 per cent permitting the use of smaller pumps.



BONUS

from the Boiler



POWER

Capital of the World . . .

THE TITUSVILLE-ATLAS

BONUS POWER means maintained high efficiency . . . longer life . . . less maintenance . . . more horsepower per total energy input. That's what you get when you install a complete TITUSVILLE-ATLAS unit, the only boiler with a patented wet back.

Wet-back design gives you maintained efficiency by eliminating back end refractories. *Result:* no down time for replacement.

Larger furnace area permits reduced fan requirements. *Result:* lower operating costs. Get BONUS POWER. Specify TITUSVILLE-ATLAS.

THE TITUSVILLE IRON WORKS COMPANY

TITUSVILLE, PENNSYLVANIA

Division of Struthers Wells Corporation

VMA-6058

NEW PLANT CONSTRUCTION —advance information on location, costs

Fairfield, Ala. —United States Steel Corp., Pittsburgh, Pa., plans to construct a six-stand, 52-in. cold reduction mill at the tin mill of its Tennessee Coal & Iron Division, located here, to roll steel for can-making tinplate. Work on the new unit will get under way at once and will be completed early in 1962.

Hanford, Calif.—Armstrong Rubber Company, 475 Elm St., West Haven, Conn., plans to construct a tire-producing facility on a 320-acre site recently acquired. Work on the new plant will get under way as soon as preliminary engineering work is completed and plant will be in production some time in the third quarter of next year.

San Francisco, Calif.—Joseph E. Seagram & Sons, Inc., 405 Lexington Ave., New York, N. Y., plans to construct a bottling, warehousing and distribution facility here, involving an ultimate investment of $8 million. Company has contracted to purchase from Western Pacific Railroad Co. eight acres in the southeast industrial area of this city, on which it plans to erect the facilities. Construction will get under way soon for completion in the spring of 1962.

San Jose, Calif.—Food Machinery & Chemical Corp., Central Engineering Laboratories, this city, will start construction at once on a new research and engineering center, adjacent to company's present facilities. Initial construction will be a 40,000-sq ft building which will house mechanical, electronic, physics and materials processing laboratories, as well as engineering and administrative offices for the center.

Atlanta, Ga.—Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland, O., plans to construct a multi-million dollar plant for paint manufacturing in the Atlanta, Ga., area. New plant will be erected on a 25-acre site 12 miles north of here and will contain about 240,000 sq ft of floor space. Proposed plant reported to cost about $4 million will have an annual capacity of 7 million gallons. Construction of a warehouse on the site will begin at once, and construction of the manufacturing plant will follow for possible completion by 1962.

Kokomo, Ind.—Continental Steel Corp., 1150 S. Main St., this city, has authorized an appropriation of more than $1 million for further expansion and improvement of its wire division. New sum brings to more than $2.5 million the amount appropriated primarily for the production and treatment of high carbon wire. Work already under way will be completed in the second half of 1961 and will increase capacity to draw high carbon wire as well as low carbon wire, and will provide oil tempering facilities.

Waterloo, Iowa—Rath Packing Company, this city, plans to modify and enlarge company's plant here at a cost of about $750,000. Work on the project will get under way at once and is scheduled to be completed in the spring of 1961. Included in the project will be the installation of hog slaughtering equipment with the latest method of immobilizing hogs electrically.

Lexington, Ky.—The Dixie Cup Division of American Can Co., 100 Park Ave., New York, N. Y., plans major expansion program at company's facilities located here. Work on an addition of 130,000 sq ft to the existing 262,000 sq ft plant will get under way at once for completion by the end of this year. Additions will cost in excess of $1 million.

Louisville, Ky.—Stauffer Chemical Co., New York, N. Y., and American Synthetic Rubber Co., this city, have jointly formed a new company, American Rubber & Chemical Co., to make synthetic rubber here. The first venture of the new concern will be construction of a plant to make polybutadiene and polyisoprene forms of synthetic rubber. Initial capacity of the plant is rated at 30,000 tons per year. Cost estimates are believed to be between $10 and $15 million. Stauffer Chemical Company's engineering department will build the plant, scheduled for completion in late 1961.

Aberdeen, Miss.—American Potash & Chemical Corp., West Sixth St., Westmoreland, Los Angeles, Calif., will begin construction this fall on a $5-million electrolytic manganese metal manufacturing plant on the Tombigee River, near here. New facility, to be located adjacent to company's sodium chlorate plant, will have an initial capacity of 10 million lb per year. New plant is scheduled for completion late in 1961.

Booneville, Miss.—American Seating Co., 901 Broadway, N. W., Grand Rapids, Mich., will begin construction at once on a new plant for the production of church furniture, with the start of operations scheduled for the spring of 1961. Cost of the project is reported to be about $1 million for the plant and an additional $500,000 for machinery and equipment.

Vicksburg, Miss.—American Metal Climax, Inc., plans to construct a plant here for the production of chlorine and potash. Plant when completed will be operated by Southwest Potash Corp., a division of American Metal Climax. Plant will produce nitrate of potash under a new process developed by Jacobs Engineering Co. and Colorado School of Mines Research Foundation. Plant will be completed and ready for operation late in 1961 at a reported cost of $7 million.

Elizabeth, N. J.—Allied Chemical Corp., 40 Rector St., New York, N. Y., plans to erect a large plant here for the production of fluorinated hydrocarbon refrigerants and aerosol propellants. New facility will be built on a site where company now produces sulfuric acid for customers in the New York and New England areas. Construction will get under way at once and plant is scheduled to be in operation by the fourth quarter of 1961.

Bronx, N. Y.—Stahl-Meyer, Inc., 172 E. 127th St., New York, N. Y., has authorized plans for a multi-million dollar meat and food processing plant. Work on the new facility is already under way and is scheduled for completion late in 1961. New plant will consolidate all Eastern processing and manufacturing of the company and serve as executive headquarters for the company's national and international operations.

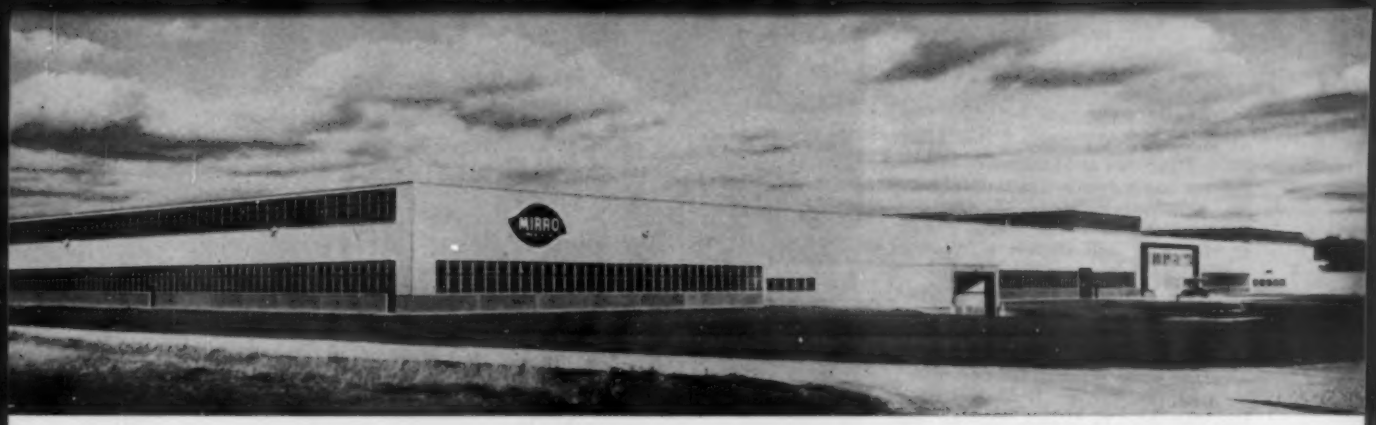
New York, N. Y.—Linde Air Products Company, a Division of Union Carbide Corp., 30 East 42nd St., New York, N. Y., plans an expenditure of $50 million over a one-year period for building and expanding 16 oxygen plants across the country. Of the 16 plants, 11 will be erected adjacent to steel plants for use by the mills in making lower cost steel. Two will be built next to chemical plants to make high purity chemicals and three will stand alone, providing oxygen for medical, missile and other uses.

Waterford, N. Y.—General Electric Co., Schenectady, N. Y., will start construction at once on a plant for the manufacture of basic silicone intermediate chemicals. New plant will replace smaller existing facilities which will be renovated to serve other manufacturing needs of the company. Work on the new structure will get under way at once at a reported cost of about $3 million.

North Lima, O.—The Pipe Line Service Corp., subsidiary of American Steel Foundries Co., 410 N. Michigan Ave., Chicago, Ill., plans to construct a pipe-wrapping and coating plant, estimated to cost in excess of $1 million, in this city. Work on the new plant is already under way and is scheduled for completion about the fourth quarter of 1961.

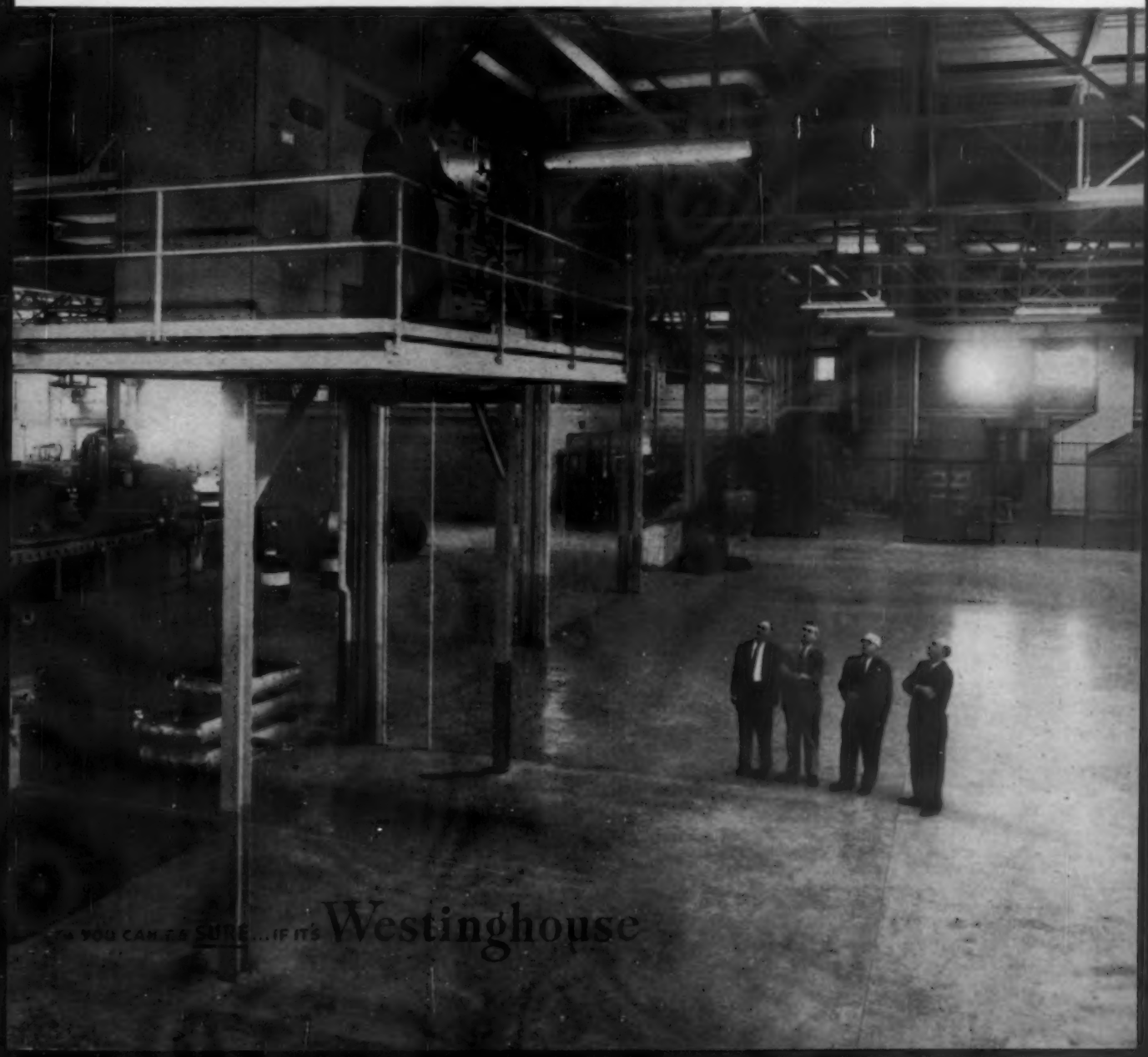
Ponca City, Okla.—Continental Oil Co., Houston, Texas, plans major expansion and improvement program of

(Continued on page 276)



New Mirro Aluminum plant can double production without changing electrical system

J-94147-1



YOU CAN BE SURE...IF IT'S Westinghouse

PRECEDING PAGE

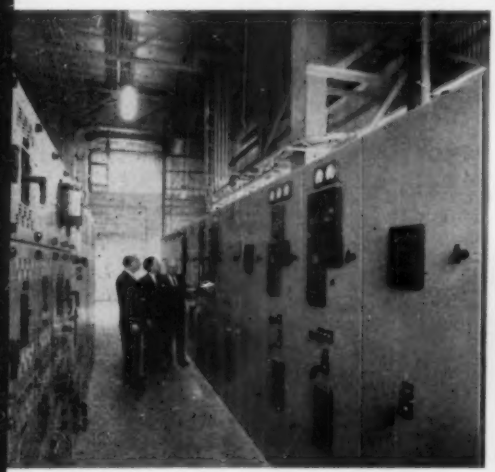
At top, Mirro Aluminum's handsome new rolling mill at Manitowoc, Wis., is appropriately sheathed in maintenance-free aluminum siding.

At bottom, men who helped Power-Up the new mill inspect a Westinghouse 1000-kva Type ASL ventilated dry-type power center which feeds power to productive equipment. Space has been provided in power center for additional drawout Type DB feeder breakers when needed. On power center platform: W. E. Reimer, Uihlein Electric Co.; J. R. Miller, Westinghouse Construction Engineer; and V. E. Mulvaney, Westinghouse Sales Engineer. Standing below: Roy Angrick, Chief Construction Engineer, Klug & Smith Co.; Edwin Zagrodnik, Mirro Rolling Mill Superintendent; M. E. Hutchins, Mirro Project Engineer and Metallurgist; and H. E. Toll, District A&S Manager, Westinghouse Electric Supply Co.

AT RIGHT

In coil slitting area, a 45-kva DT-3-B dry-type transformer with attached primary circuit breaker is mounted at the load to provide 120/208-volt power for lighting. Maintenance-free, lightweight Westinghouse transformers are easily mounted off the floor. On side of control cabinet: a 225-amp, J-frame Westinghouse AB-I circuit breaker which protects control unit. Talking over plant's electrical system: J. R. Miller, H. E. Toll, Roy Angrick and W. E. Reimer.

J-94147-2



Imposing line-up of 5-kv indoor metal-clad switchgear with Type DH drawout air circuit breakers. Used for control of mill's synchronous and induction motors, they are also used to protect feeder circuits to power centers throughout the plant. (At left) Low-voltage drawout switchgear end of a 1000-kva power center. Messrs. H. E. Toll, W. E. Reimer and M. E. Hutchins inspect 50-DH-250 main breaker compartment.

Westinghouse power system planned for today's . . . and tomorrow's production

The progressive Mirro Aluminum Company has taken a big step forward in its long-range expansion program. Recently completed: a heavy-duty, fully integrated aluminum rolling mill at Manitowoc, Wis., covering 238,818 square feet. Present annual capacity: 60 million pounds of aluminum for use in cookware, electric housewares, boats, foil, toys, and component parts for industry. Anticipating Mirro's production goals and planned product diversification, plant output can be doubled . . . *with no major alterations in the plant's electrical system.*

Westinghouse, working closely with Mirro representatives, the consulting engineer and electrical contractor, participates in the design of a plant system that's adequate for today, ready for tomorrow. Standard Westinghouse apparatus, capable of meeting the stringent requirements of process equipment, was specified for the primary distribution system. Eliminated was the need for expensive, specially engineered or custom-built apparatus.

The planning team found that a simple, modified, modern radial distribution system using 5-kv Type DH breakers feeding individual power centers at main points of load would best serve the plant. Distributing high-voltage power, this type of system reduces losses, cuts feeder circuit costs and improves voltage regulation. A definite requirement of process equipment switching was drawout Type DB, heavy-duty circuit breakers which can be easily inspected and maintained.

Realizing that every possible inch of floor space should be productive, the team chose Westinghouse equipment that could be installed in out-of-the-way areas yet provide on-the-spot power. For example, the maintenance-free, ventilated dry-type power center transformers are approximately 33% lighter than liquid units of same ratings. They can be mounted on overhead platforms or balconies near the loads served, but out of productive areas. Aluminum busbars in the switchgear also reduce weight and require smaller platforms to support the power center. *(cont'd.)*

YOU CAN BE SURE... IF IT'S Westinghouse

J-94147-3

At aluminum casting station, a 30-hp, totally enclosed, fan-cooled Westinghouse Life-Line® "A" motor drives a hydraulic pump. Sealed, prelubricated ball bearings eliminate greasing, while Bondite-Mylar* insulation means longer motor life, longer continuous production. Roy Angrick and V. E. Mulvaney check the installation.

*Du Pont registered trade-mark

W. E. Reimer explains to H. E. Toll and Edwin Zagrodnik how 4160-volt, unfused, 600-amp, Westinghouse Type LCB switch serves as a disconnect switch for drive motor in plant's 800-hp foil mill motor-generator set. Switch is wall mounted to save space. Westinghouse oiltite pushbutton station remotely starts motor at metal-clad switchgear.

Power comes to Mirro's plant at 67,000 kv and is stepped down to 2520/4360 volts by three Westinghouse 2500-kva, Type SL, single-phase transformers. (Fourth unit is a spare.) Transformers are protected by Westinghouse-developed Insuldur®, the ultimate in insulation, which allows peak period overloads without damage. Shown are M. E. Hutchins, V. E. Mulvaney and Edwin Zagrodnik.

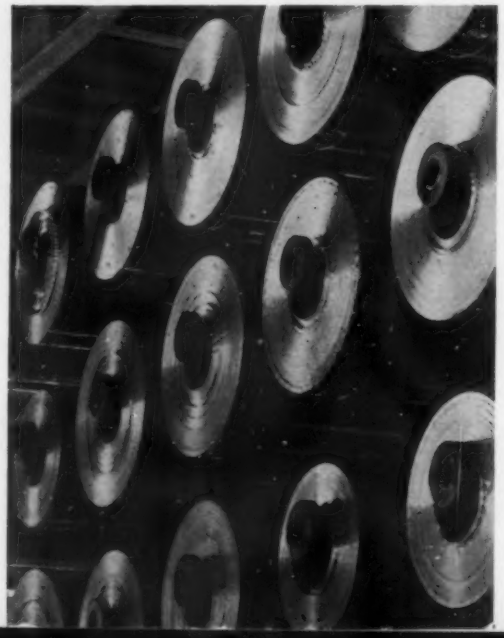
Necessary 480-volt power for plant is carried from small, outdoor transformers to indoor switchgear by weatherproof, low-impedance, 1350-amp Westinghouse bus duct that assures high efficiencies of feeder circuits. Tap openings conveniently spaced along duct provide easy means of connection to power company transformers.

Westinghouse Powers-Up Mirro Aluminum plant *(cont'd.)*

In industrial plants, Powering-Up electrically with an eye on today's *and* tomorrow's needs can mean outstanding benefits and savings. For information about how Westinghouse can help you Power-Up, see your nearest Westinghouse distribution outlet . . . or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

OWNER: Mirro Aluminum Company, Manitowoc, Wis.
CONSULTING ENGINEER and GENERAL CONTRACTOR: Klug & Smith Co., Milwaukee, Wis.
ELECTRICAL CONTRACTOR: Uihlein Electric Co., Milwaukee, Wis.
WESTINGHOUSE DISTRIBUTOR: Westinghouse Electric Supply Co., Milwaukee, Wis.

Gleaming spools of aluminum foil produced in new Mirro rolling mill are ready for retail packaging for consumer use.



J-94147-4

YOU CAN BE SURE... IF IT'S Westinghouse

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They dug their way through a production bottleneck

These men are working the heading of a tunnel being built with Armco Tunnel Liner Plates. At first glance it seems an unusual way to solve a plant production problem. Yet, in many cases, it is an ideal answer.

Consider the problem of two units of a plant separated by a street or railroad. A tunnel provides safe, all-weather access with no cross traffic. Consider, too, the advantages of tunneling for installation of other underground facilities such as pedestrian underpasses, utility line conduits, and even sewers and other drainage structures.

Tunneling gets the job done without disrupting surface installations. Work is underground—out of the way. For details about Armco Liner Plate, use the handy coupon. We'll send the data you need. Armco Drainage & Metal Products, Inc., 7380 Curtis Street, Middletown, Ohio.

Steel

New steels are born at Armco

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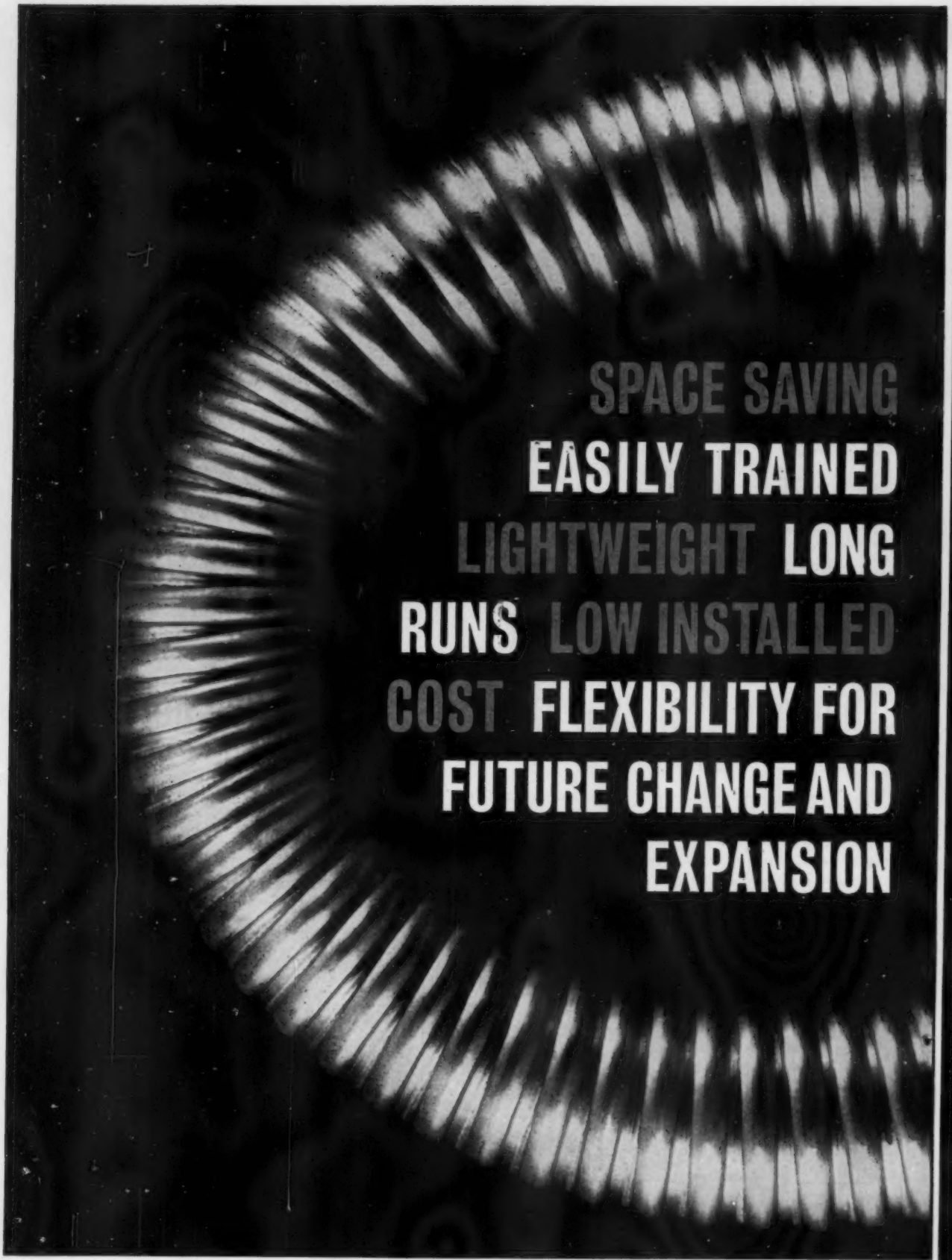
SPACE SAVING
EASILY TRAINED
LIGHTWEIGHT LONG
RUNS LOW INSTALLED
COST FLEXIBILITY FOR
FUTURE CHANGE AND
EXPANSION

GENERAL CABLE

INTERLOCKED ARMORED CABLE

For full protection under all conditions install General Cable Interlocked Armor...the cable for power, control, communication and lighting systems. This compact, versatile cable is available in a wide range of constructions, insulations, armors and voltage ratings. Colored polyvinyl chloride jacket over the armor can be furnished where required. "How to Obtain the Greatest Advantage Per $ Spent" a comprehensive folder detailing General Cable's complete line of Interlocked Armored Cables is available upon request. **General Cable Corporation**, 730 Third Avenue, New York 17, New York. Offices and Distributing Centers Coast-to-Coast.

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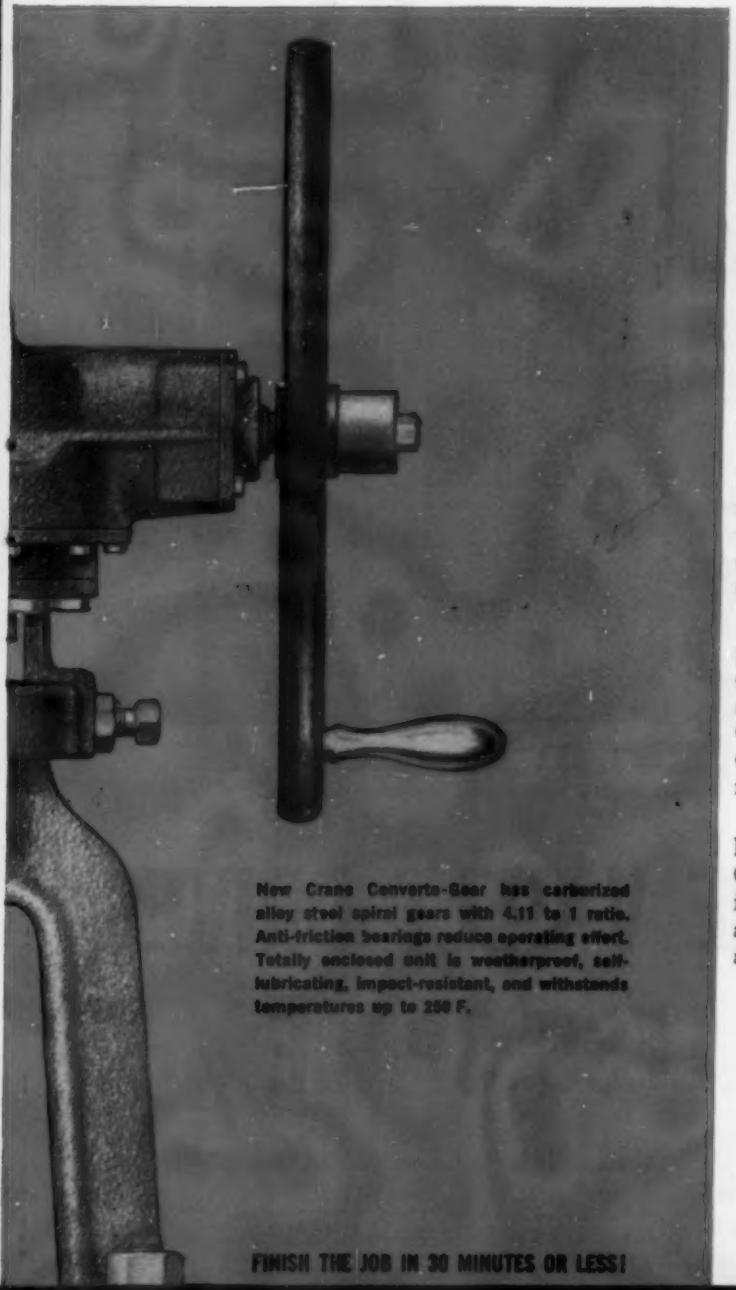
CRANE DIRECTION '70

. . . a fast-moving program of planned expansion, product development, and streamlined distribution to help our customers meet the competitive challenges of the Sixties.

NEW! You can order this CRANE Converto-Gear Valve Operator from stock... install it in less than 30 minutes



New Crane Converto-Gear has carburized alloy steel spiral gears with 4.11 to 1 ratio. Anti-friction bearings reduce operating effort. Totally enclosed unit is weatherproof, self-lubricating, impact-resistant, and withstands temperatures up to 250 F.

Only three parts needed to convert your OS & Y valve to gear operation: (a) Crane Converto-Gear Operator, (b) adapter for mounting operator on valve, (c) yoke sleeve adapter. Handwheel and mounting bolts furnished with conversion kit.

Now you can convert to rapid, easy gear operation on many of your Crane iron and steel gate valves without removing them from the line! Changeover is simple and fast with Crane's new Converto-Gear Operator.

Your Crane Distributor can give you complete information on this brand-new idea in gear operators for gate valves. The Converto-Gear is standard and universal, readily mounted on Crane iron and steel gate valves in sizes from 6-inch to 36-inch, in outside screw and yoke or non-rising stem patterns.

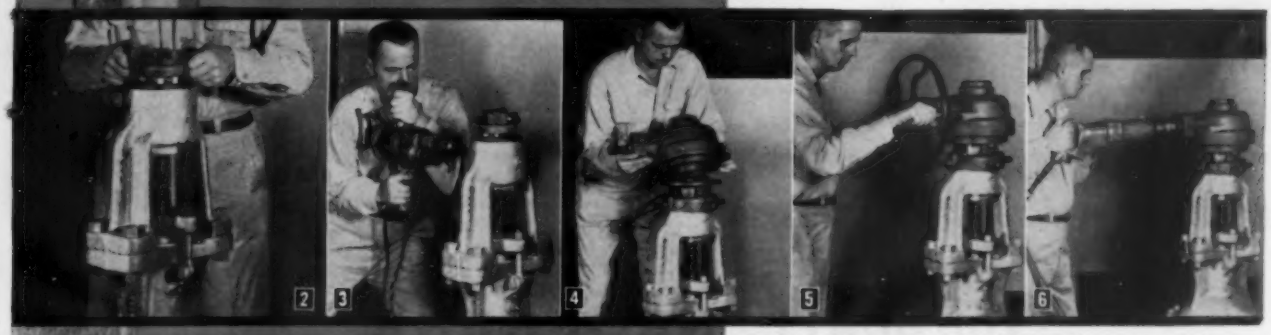
And new orders for gear operated valves can be filled with unprecedented speed because the Converto-Gear can be supplied on valves right from stock. No special yoke castings or brackets are needed . . . just the basic gear operator and a simple two-piece adapter.

CRANE®

CRANE CO., INDUSTRIAL PRODUCTS GROUP
4100 S. KEDZIE AVE., CHICAGO 32

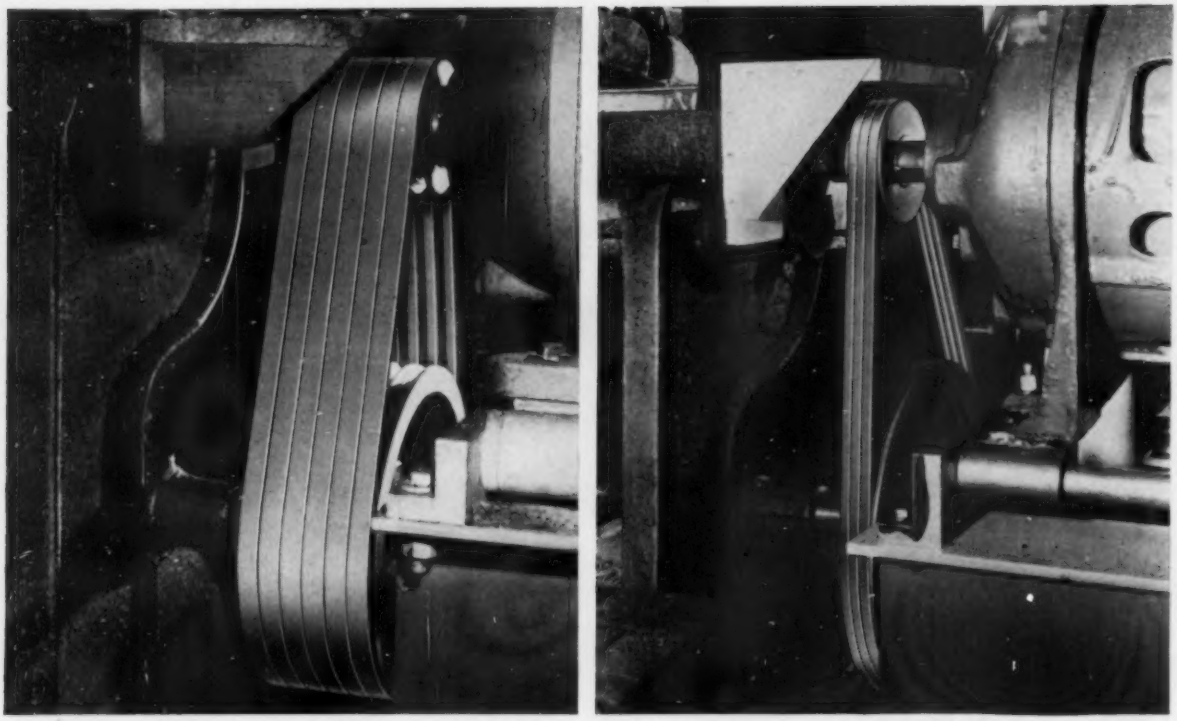
VALVES • ELECTRONIC CONTROLS • PIPING
PLUMBING • HEATING • AIR CONDITIONING
HEAT EXCHANGERS • CYCLOTHERM® BOILERS

FINISH THE JOB IN 30 MINUTES OR LESS!



To convert your OS & Y valve, (1) remove the handwheel, (2) mount the yoke sleeve adapter, (3) countersink 4 holes for the Converto-Gear adapter, (4) bolt the adapter in place and attach your Crane Converto-Gear Operator, (5) and you're ready for smooth, manual operation, (6) or fast operation with an air or electric power operator.

For more facts circle 581 on Reply Card



A large eastern manufacturer switched from heavy six belt drives (above left) to lightweight three belt drives (above right). This was made possible by the use of a new high-capacity neoprene V-belt. Each new drive uses 68% less space, thus creating much needed additional aisle area.

NEW NEOPRENE V-BELT DRIVES USE 68% LESS SPACE

These new, remarkably compact V-belts were developed and thoroughly field-tested by a leading manufacturer of industrial rubber products. Du Pont neoprene synthetic rubber was used because of its outstanding resistance to oil, abrasion, heat and aging.

The new belts have superior pulling power because of a special tensile construction plus a newly designed cross-section, with arched top and concave sidewalls. These features result in a belt that is smaller, stronger and more durable than conventionally designed belts of the same HP capacity.

These new high-capacity belts are designed to take advantage of neoprene's balanced combination of properties to meet the requirements for modulus, abrasion and resistance to industrial hazards. Whatever the job, the dependable, long life of a neoprene belt can help you increase efficiency and reduce maintenance costs. For information, call your local rubber goods distributor. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department PE-9, Wilmington 98, Delaware.

DU PONT
REG. U. S. PAT. OFF.

NEOPRENE
SYNTHETIC RUBBER

Better Things for Better Living . . . *through Chemistry*

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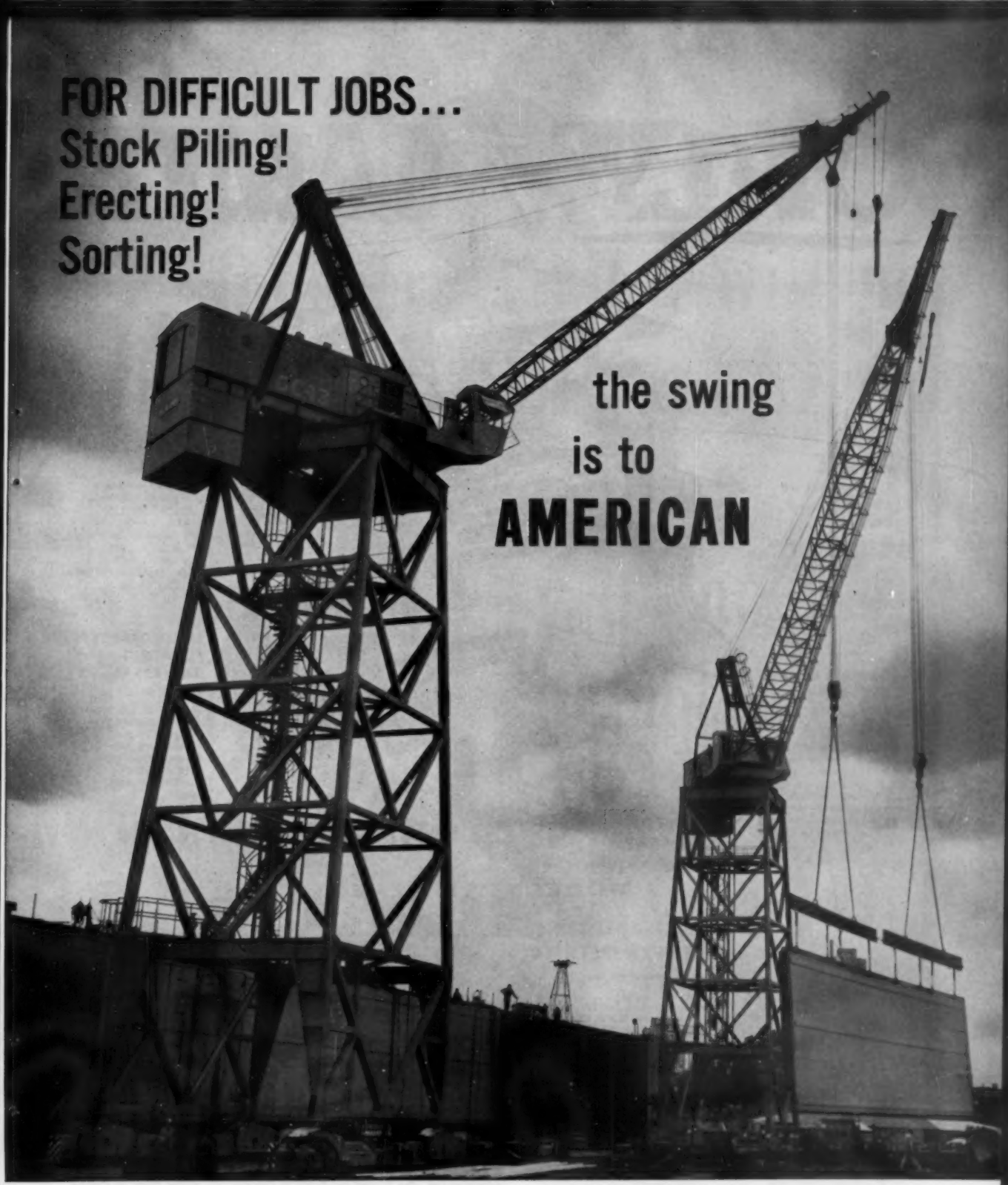

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EXCAVATORS-CRANES to 4½ yds.-110 tons
LOCOMOTIVE CRANES to 130 tons

DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

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Forged fittings for wire rope-chain

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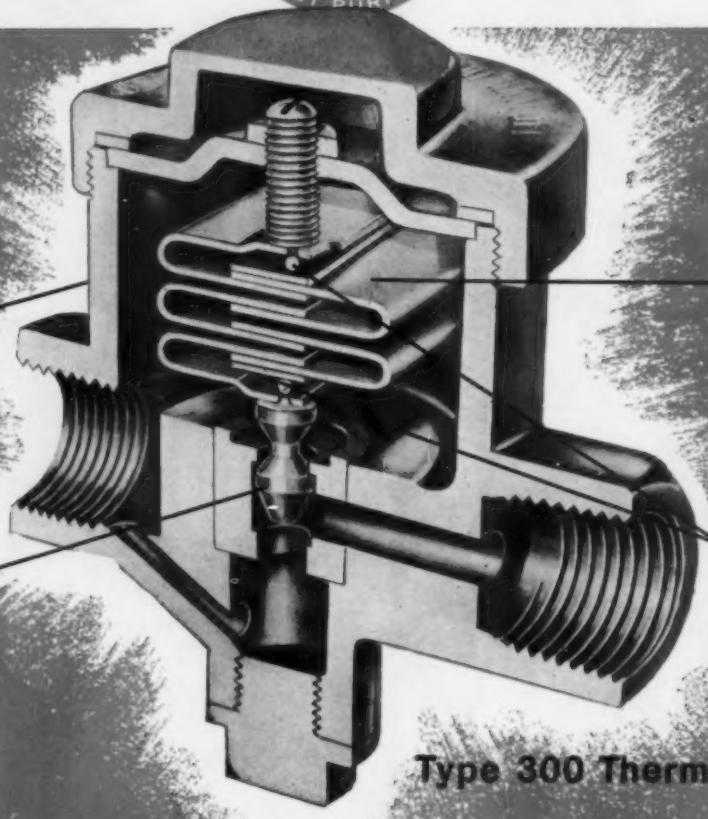
ONLY Farris MIL

PROGRESS THROUGH HONEST PURPOSE



FORGED MANGANESE BRONZE BODIES

Standard trap bodies (except the float models) are forged manganese bronze, selected for long life on steam. Aluminum bronze bodies also available.

HAND LAPPED PRESSURE BALANCED VALVES

Every Farris Mil valve is individually hand lapped to seat perfectly on the stainless steel insert. Valves are unaffected by pressure changes, respond only to temperature change.

INDESTRUCTIBLE BI-METAL

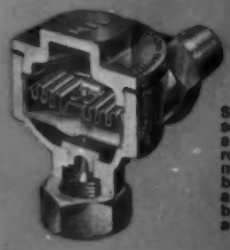
All Farris Mil trap bi-metallic thermal elements are high quality stainless steel. Cannot be damaged by water hammer, frost or corrosion. 2° sensitivity.

FRICTION-FREE FLOATING UNIVERSAL JOINTS

Bi-metallic element and valve cannot hang up or jam—no friction—no wear—no corrosion—no wire drawing—no maintenance.

Type 300 Thermostatic

3 MODELS...9 TYPES



SELF-ADJUSTING THERMOSTATIC

Self-Adjusting models are factory set to release water and air from a steam system as well as to release condensate at a predetermined temperature. Available in 4 body patterns in 25 psi, 65 psi and 125 psi ratings, forged bronze bodies, stainless steel element and valve, aluminum bronze seat.

FLOAT THERMOSTATIC

Float type Farris traps provide rapid high capacity venting of air and cold condensate at start-up. Unique rocker design gives high mechanical advantage. Body is hi-tensile iron, all mechanical parts stainless steel. Available in 75 psi and 150 psi ratings.

EFFICIENT TRAPPING DEPENDS ON THERMAL CHANGE! SAVE WITH MIL THERMOSTATIC TRAPS FOR ALL PLANT-WIDE SERVICE

SEND FOR NEW CATALOG

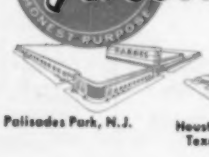
Free 8 page Farris Mil trap catalog #FE-310 gives complete dimensional data, performance information, and capacities for all 9 types.

Manufactured under patents, patents pending and licenses of Midland Industries Ltd., the largest producer of thermostatic steam traps in Europe.

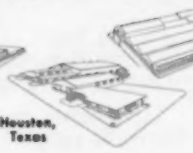
Farris **ENGINEERING CORP.**

MIL DIVISION

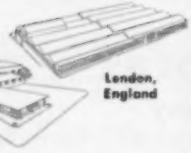
557 COMMERCIAL AVENUE • PALISADES PARK, N. J.



Palisades Park, N.J.



Houston, Texas



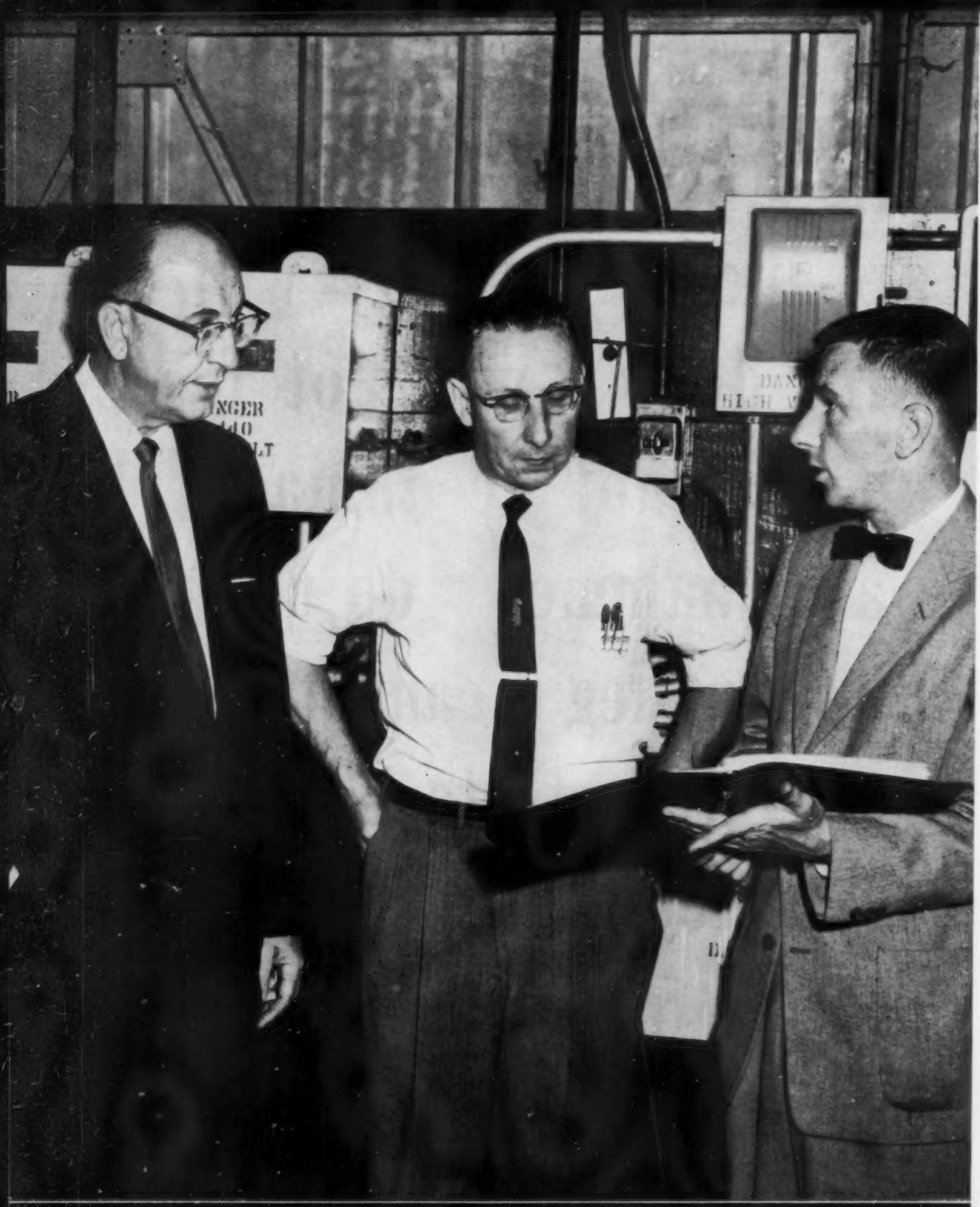
London, England

AFFILIATES:
Farris Flexible Valve Corp. • Farris Engineering Ltd., London, England • Farris Universal Machine Corp. • Farris Combustion Controls Corp. • Midland Industries Ltd., Wolverhampton, England

STEAM TRAPS

are indestructible ■ will not wire draw ■ will not freeze up ■ cannot be damaged by water hammer ■ do not need a cooling leg ■ cannot corrode ■ operate instantaneously ■ are pressure balanced ■ have full floating, friction free, self aligning, stainless steel valves ■ cost less ■ are guaranteed two years

OVER A MILLION IN USE! TRY US—SEND YOUR ORDER FOR ONE OR MORE TRAPS. YOUR MONEY BACK IF THEY DO NOT PERFORM AS STATED!



Roy Lindeman, Purchasing Agent, and Al Krannich, Assistant Chief Engineer, of the Burt Manufacturing Company, Akron, Ohio, discuss Westinghouse products as applied to Burt fan-ventilator equipment with R. R. Burke, Salesman for Moock Electric Supply Co., Akron.

YOUR WESTINGHOUSE DISTRIBUTOR SALESMAN—

His training and experience can save you money and man-hours

A firsthand tour of your plant by a Westinghouse distributor can often bring on-the-spot, money-saving suggestions.

Frequently, your Westinghouse distributor can suggest new, improved products or offer advice on product applications. He may even suggest the use of a standard Westinghouse product to fit your "custom" installation, helping you ring up solid savings in money and man-hours.

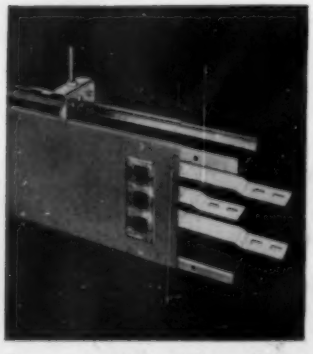
Your Westinghouse distributor sees many electrical systems. He's in an excellent position to observe new Westinghouse products and techniques at work . . . and give you the benefit of his experience.

He will help you get the fastest delivery possible on electrical equipment you urgently need . . . or he will schedule delivery to suit your modernization or replacement plans.

Your Westinghouse distributor is ready with the most valuable product he can offer you . . . SERVICE. J-94140

YOU CAN BE SURE...IF IT'S Westinghouse

Here are three of the 17,000 items handled by your Westinghouse distributor:



Compact, lightweight, efficient Westinghouse bus duct installs fast and at low cost. Extreme flexibility speeds future expansion or plant layout changes. Available from your distributor to meet secondary power distribution needs.

Westinghouse capacitors improve power factor. Indoor dustproof capacitors seal out dust and lint, and guard against contact with live parts. Comply with NEC requirements. Your distributor can supply Westinghouse capacitors to fill any industrial application.

Economical Westinghouse CSO industrial luminaire uses super-high output fluorescent lamps. Unique "chimney" construction dissipates heat, creates updraft to keep unit clean, provides 20% uplight for visual comfort.

"Watch for the Westinghouse Industrial Apparatus Caravan"

For more facts circle 585 on Reply Card

COSMETICS LABORATORY

FOOD LABORATORY

PLASTICS LABORATORY

DETERGENT LABORATORY

FLEXIBLE CONTROL OF AIR CONDITIONING

Required for Atlas Powder Company Technical Center

Atlas Powder Company's Technical Center in Wilmington, Delaware, demands exceptional variety and precision in the control of temperature and humidity. Especially sensitive spots include the constant temperature and humidity rooms and variable temperature and humidity rooms, where tests can be conducted under rigidly controlled conditions.

Throughout the center, elaborate facilities are provided both for product testing and development and for basic research. Laboratories are devoted to research and testing of foods, pharmaceuticals, paints, textiles, and cosmetics, as well as industrial chemicals.

To meet the diversified needs of this modern R & D facility, the building is equipped with a specially engineered Johnson Air Conditioning Control System. Individual room controls assure the exact climate required for each of many purposes.

As in so many industries today, efficiently controlled air conditioning plays an important role in sustaining high working efficiency, in attracting competent personnel, and in reducing absenteeism and costly turnover — in addition to meeting the special thermal requirements of products and manufacturing processes.

Whether your problems concern comfort control or the regulation of process air conditioning, the specialized Johnson organization can install a control system designed to meet your exact requirements. When you build or air condition, ask your consulting engineer, architect, or local Johnson representative to explain the unmatched performance features and operational savings a Johnson System offers.

Johnson Service Company, Milwaukee 1, Wisconsin. 105 Direct Branch Offices.

CHEMICAL RESEARCH LABORATORY

JOHNSON CONTROL

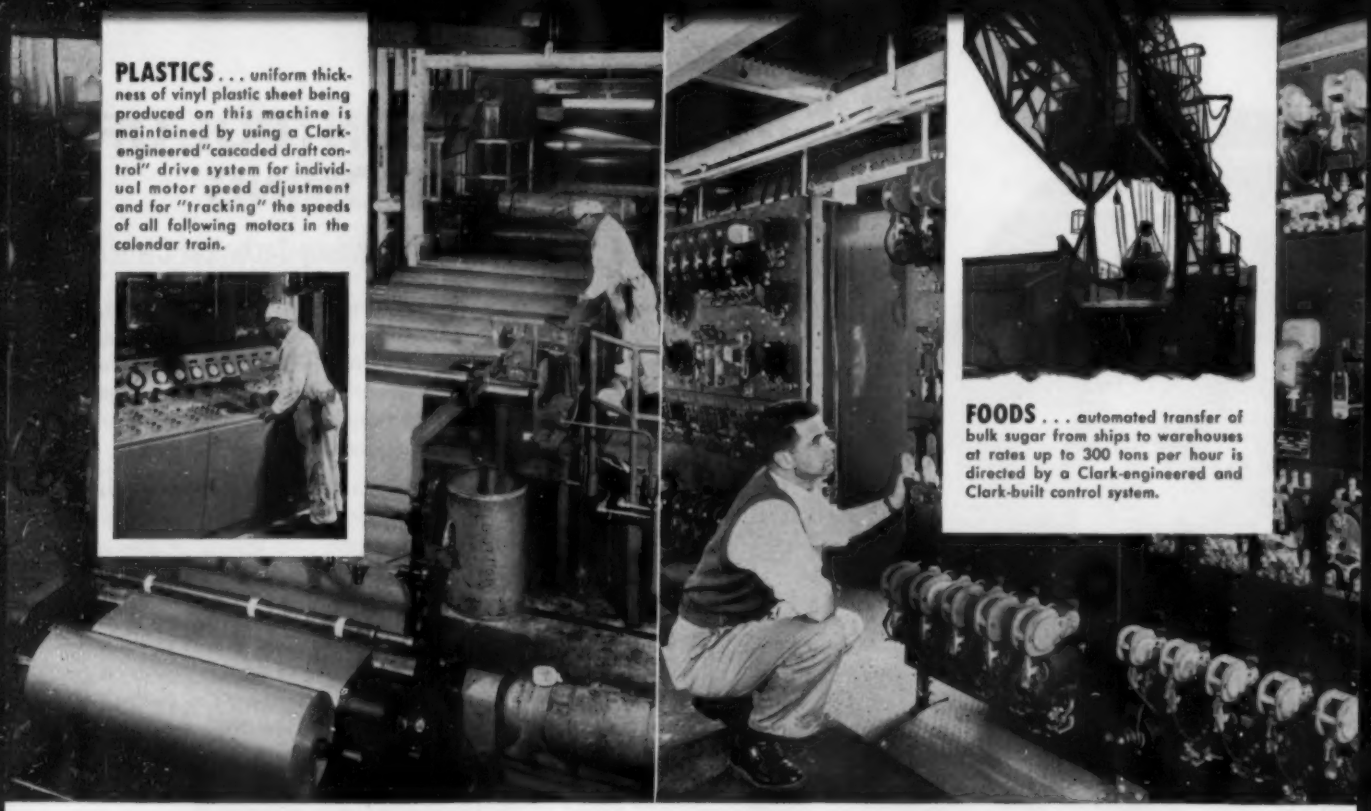
PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

Technical Center, Atlas Powder Company, Wilmington, Delaware. Designed and built by H. K. Ferguson Co., New York.

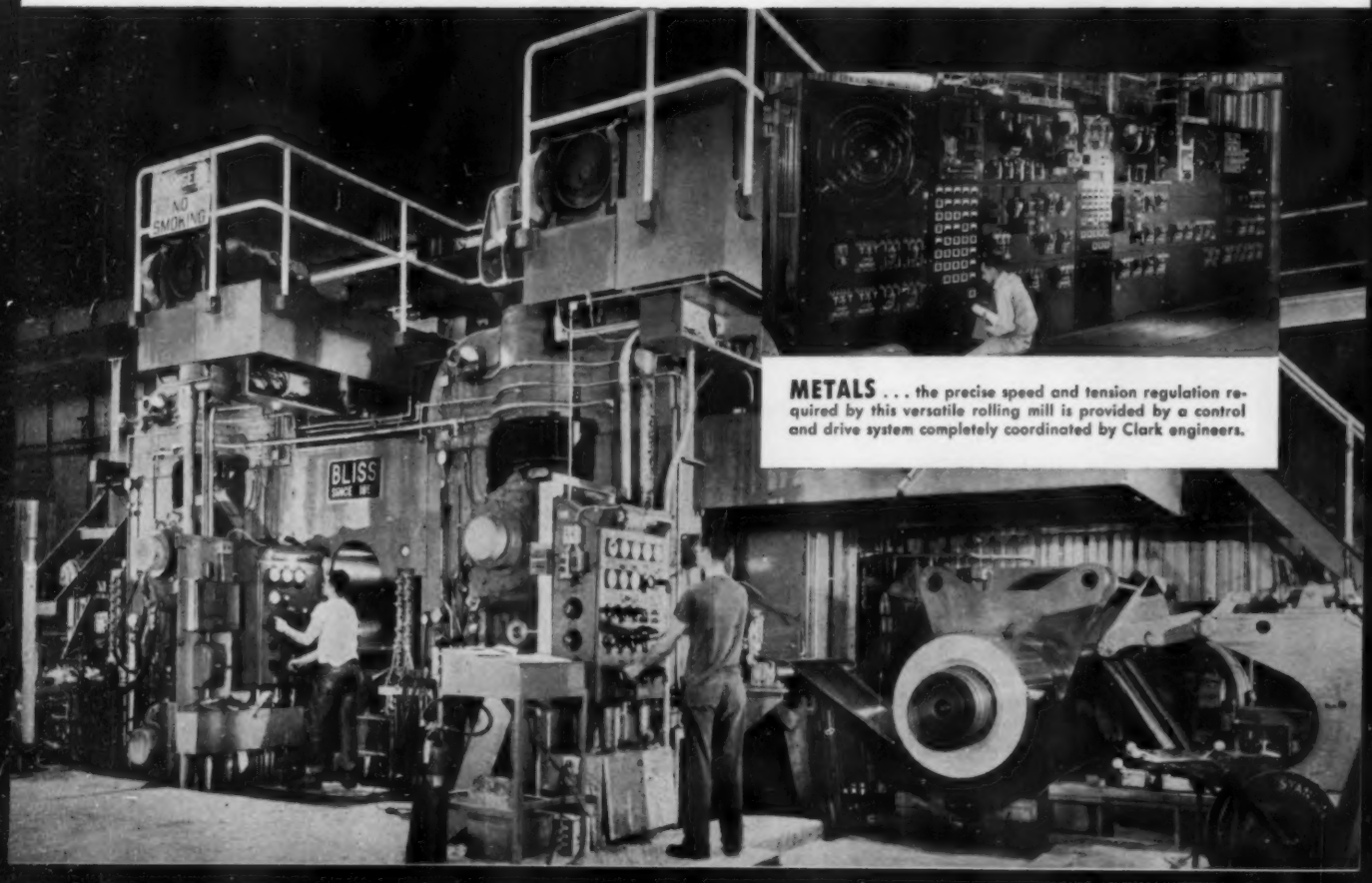
For more facts circle 586 on Reply Card

PLASTICS . . . uniform thickness of vinyl plastic sheet being produced on this machine is maintained by using a Clark-engineered "cascaded draft control" drive system for individual motor speed adjustment and for "tracking" the speeds of all following motors in the calendar train.



FOODS . . . automated transfer of bulk sugar from ships to warehouses at rates up to 300 tons per hour is directed by a Clark-engineered and Clark-built control system.

How to get the most from



METALS . . . the precise speed and tension regulation required by this versatile rolling mill is provided by a control and drive system completely coordinated by Clark engineers.

AUTOMOTIVE . . . to speed up auto body production and reduce idle time on three body conveyor lines, a complete control system with step-type speed selection was developed and supplied by Clark Controller.

your machines and processes

Automatic control is the most vital element in today's automated processes, systems and machines.

Clark engineers are specialists in automatic controls, and Clark's control equipment—relays, contactors, push buttons, control centers, etc.—is designed with a thorough knowledge of specific industry requirements.

Clark is therefore ideally qualified to furnish complete coordinated control and drive systems.

Perhaps this great combination of product and experience can help you directly. It makes no difference what industry or type of production machinery or process. More and more automation-minded manufacturers everywhere are turning to Clark for completely coordinated control engineering service and equipment.

From concept to start-up, Clark engineers work as partners with engineering and manufacturing personnel, consulting engineers, contractors, and equipment manufacturers. We welcome the opportunity to show you how they can work for your particular advantage. For more information, contact your nearest Clark Controller sales office. Or, write direct.

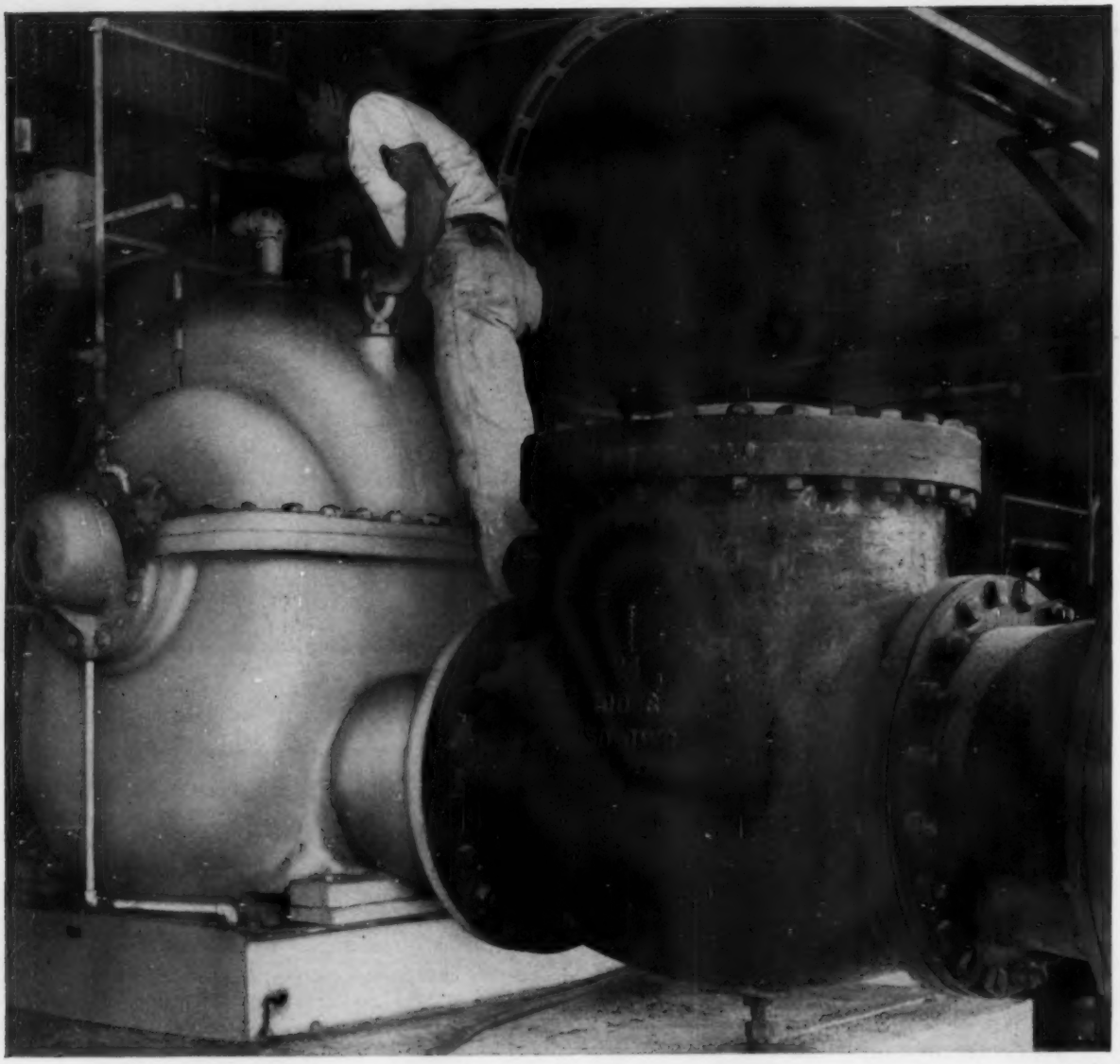
60 A1

The
CLARK CONTROLLER
Company

"Everything Under Control"

Main Plant: *Cleveland 10* • **Western Plant:** *Los Angeles 58*
In Canada: *Canadian Controllers, Limited, Toronto*

For more facts circle 587 on Reply Card



Nickel Cast Iron...economical way to get strong, pressure-tight pump casings

This pump casing contains 2% nickel – enough to make a big difference in performance at a practical cost.

St. Regis Paper Co. depends on the pump to deliver 20,000 gmp of circulating water to condensers and evaporators at its Jacksonville, Fla. plant. Because the circulating water is brackish – often almost pure seawater – the pump casing must withstand heavy corrosive and erosive attack. But these are only a few of the reasons why 2% nickel cast iron was used by the pump's builder, C. H. Wheeler Manufacturing Co., Philadelphia.

Nickel helps cast for strength, tightness, machining benefits. Right in the foundry, Nickel helps provide accurate control over properties wanted in a casting. Nickel cast irons offer great resistance to corrosion, erosion and wear. Nickel helps castings form a uniformly dense grain structure, helps increase pressure-tightness by minimizing porosity. Besides increasing strength, adding nickel to the melt means improved machining properties – which can save production costs on many types of cast fluid-handling equipment.

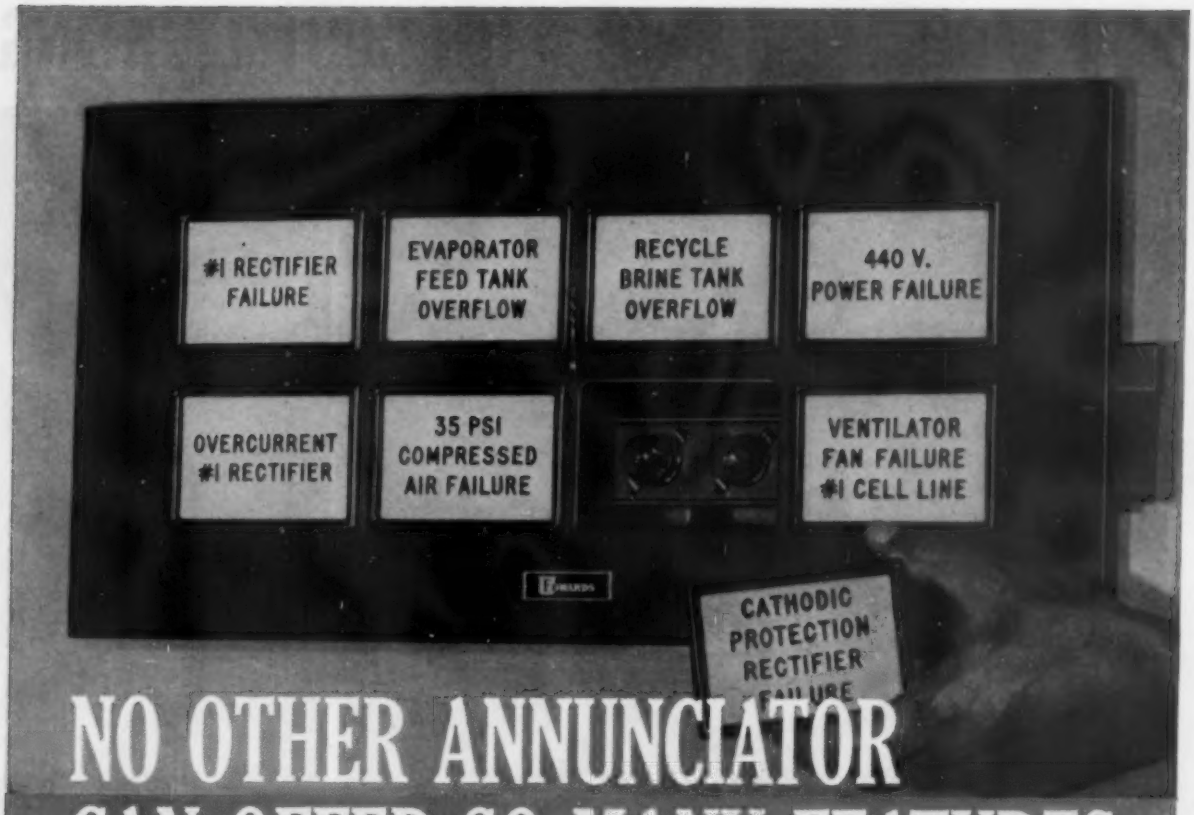
The useful 32-page booklet, "Engineering Properties and Applications of Nickel Cast Irons" describes these and other important advantages. A postcard will bring it to you.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL MAKES CASTINGS PERFORM BETTER LONGER

For more facts circle 588 on Reply Card


#1 RECTIFIER FAILURE
EVAPORATOR FEED TANK OVERFLOW
RECYCLE BRINE TANK OVERFLOW
440 V. POWER FAILURE
OVERCURRENT #1 RECTIFIER
35 PSI COMPRESSED AIR FAILURE
VENTILATOR FAN FAILURE #1 CELL LINE
CATHODIC PROTECTION RECTIFIER

NO OTHER ANNUNCIATOR CAN OFFER SO MANY FEATURES

Now from Edwards long experience in annunciator systems, comes a completely new line of lamp annunciators incorporating outstanding operational features . . . developed in cooperation with consulting engineers, leading power stations, chemical process and industrial plants. Design and operational flexibility is keyed to present and future demands of automatic process control and all types of automated systems. Edwards technical specialists in 58 cities across the country can show you how Edwards lamp annunciator systems can provide the most reliable flexible operation for every type of indication. Write for your copy of a new descriptive Bulletin A-200. Edwards Company, Inc., Norwalk, Conn.

NO OTHER ANNUNCIATOR OFFERS YOU ALL THESE FEATURES:

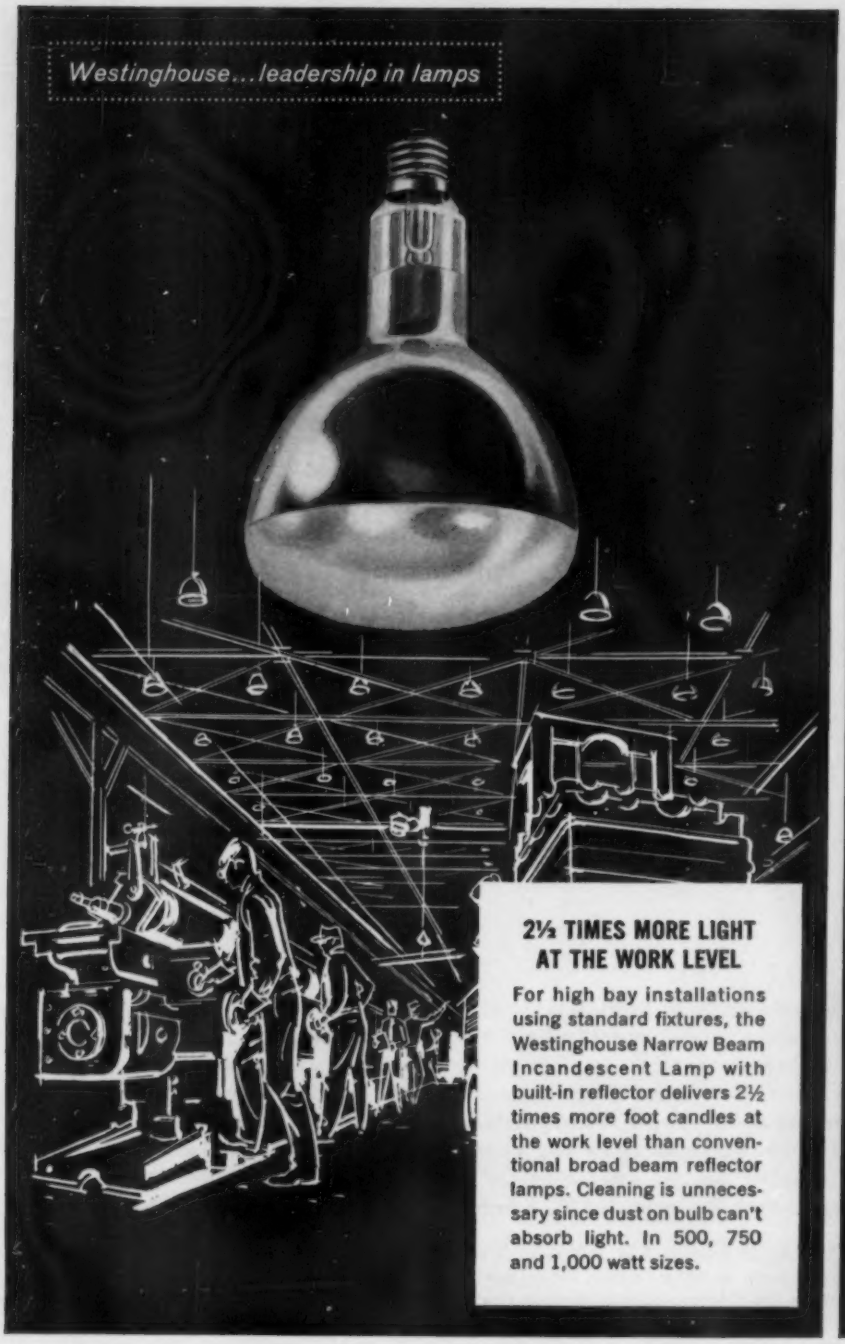
Operation: 1. Operational sequences may be changed without altering terminals, connectors or jumpers, even while power is on. 2. Operation from normally-open or normally-closed circuit contacts may be easily changed after installation by merely plugging in the designated relay unit. 3. No power drain—no "dropping resistors" to burn out or cause internal heating. 4. Wide selection of operational sequences. 5. Simple specific purpose "plug-in" circuits. 6. Indicating circuit provides extra contacts and independent terminals for data logging or other control functions. 7. Test for all indicating lamps on annunciator as standard equipment. **Design:** 1. Complete modular construction for flexibility of application. 2. One-piece molded lamp compartment and indicating plates snap into position. 3. Long-life under-voltage, double contact bayonet lamps will not loosen. 4. Relamping from front without opening door. 5. Lamps in multiple, no signal loss in burnout. 6. Dust resistant, continuous gasket front and back. 7. No exposed live parts. 8. Circuits plug in—vibration-proof lock. 9. No mounting holes required for panel mounting types. 10. Long-life relays—high temperature insulation, diffused gold contacts of higher rating, nylon coil, sealed windings. 11. Hermetically-sealed relays available when specified. 12. Heavy-duty barrier-type terminals accommodates through No. 10 AWG wire.

EDWARDS

SPECIALISTS IN SIGNALING SINCE 1872 / FOR CONTROL • COMMUNICATION • PROTECTION / IN CANADA: EDWARDS OF CANADA, LTD., OWEN SOUND, ONT.

For more facts circle 589 on Reply Card

FOR HIGH EFFICIENCY, LOW-COST LIGHTING



2½ TIMES MORE LIGHT AT THE WORK LEVEL

For high bay installations using standard fixtures, the Westinghouse Narrow Beam Incandescent Lamp with built-in reflector delivers 2½ times more foot candles at the work level than conventional broad beam reflector lamps. Cleaning is unnecessary since dust on bulb can't absorb light. In 500, 750 and 1,000 watt sizes.

The high efficiency lamps shown above demonstrate the ability of Westinghouse to reduce lighting costs. In the Westinghouse line you'll find the correct lamp to give you one or more of the following benefits: greatest savings in lamp purchases; lowest maintenance cost; the most light at the same or lower cost; the most efficient use of power. Call your Westinghouse Lamp Representative today. You can be sure . . . if it's Westinghouse.

Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey

...CHOOSE WESTINGHOUSE LAMPS

UP TO 60% GREATER USEFUL LIGHT OUTPUT

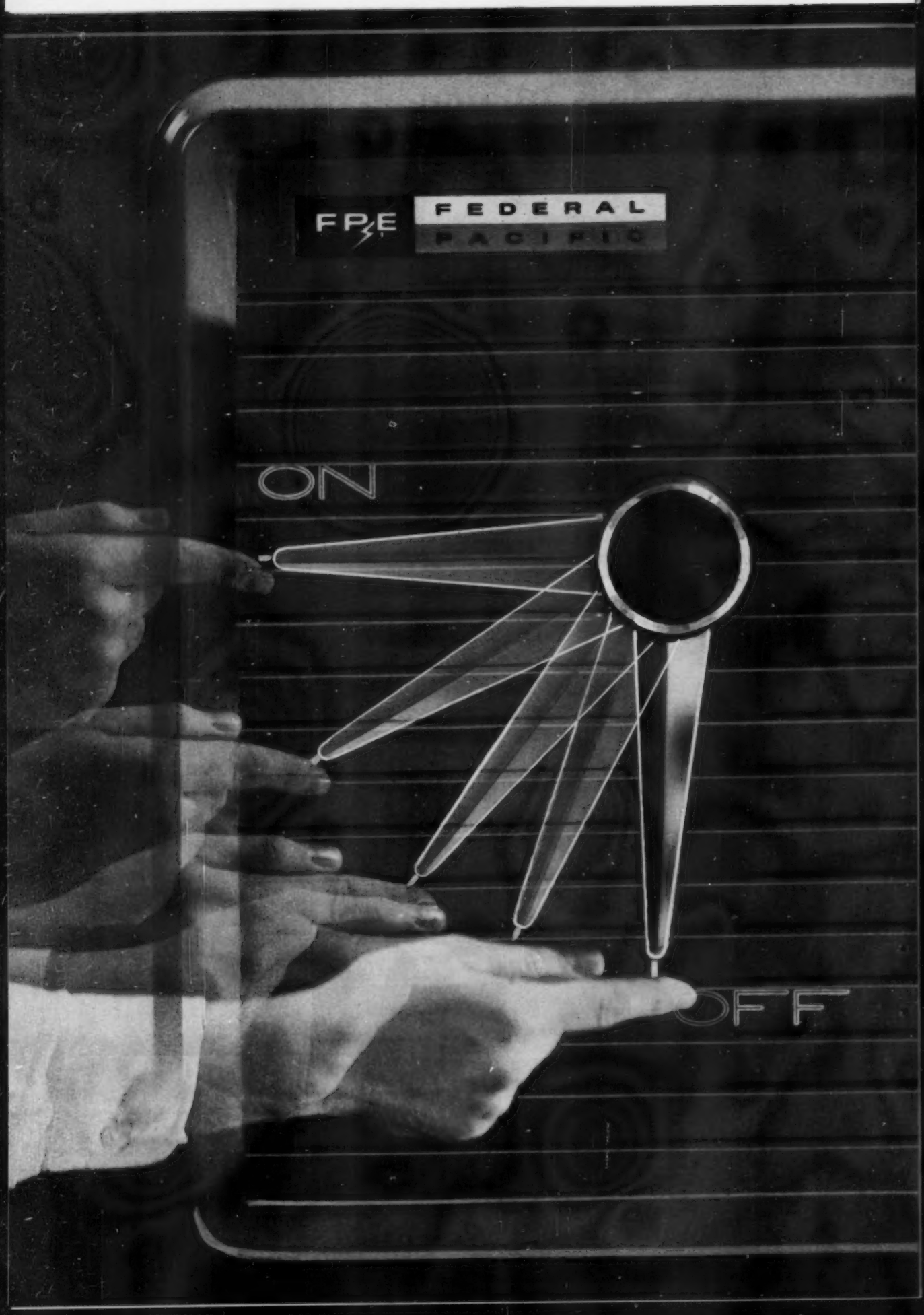
Because it directs 60% more light downward than conventional types, the Westinghouse Reflector Fluorescent Lamp is ideal for displays and work areas. Comes in bi-pin and single pin types. The latter can be rotated for precise light control. Built-in reflector cuts maintenance. In 48 and 96 in. sizes; 40 and 90 watts.

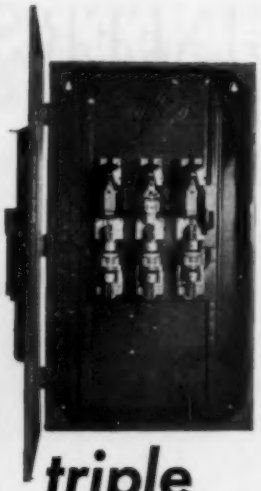
UP TO 20% MORE LIGHT THAN OLDER TYPES

Besides delivering up to 20% more light at the work level, Westinghouse Lifeguard Mercury Lamps maintain up to 86% of initial output after 9,000 hours of use and provide 12,000 hours of high light output. Lifeguard Arc Tube prevents darkening of glass with ensuing loss of light. In the long run, this is the most economical lamp you can buy. In 400, 700 and 1,000 watts.

Westinghouse

For more facts circle 590 on Reply Card


FPE
FEDERAL
PACIFIC
ON
OFF



triple safety at your fingertips!

Only the Federal Pacific type A-plus switch gives you triple protection. the complete safety of visible blades, plus the high current capacity of a circuit breaker, plus the high interrupting capacity of fuses. And at the touch of the big Rotary Handle, fingertip operation opens and closes the A-plus switch instantly—with a quick-make, quick-break mechanism that is fast . . . teaseproof . . . safe. What's more, the A-plus switch is rated for load break, not just disconnecting duty! Feature for feature, there is no switch that compares with the A-plus safety switch. Federal Pacific heavy duty industrial switches are available in ratings 30 through 1200 amperes, 250 and 600 volts, indoor and weatherproof enclosures. Write for Bulletin 1241, Dept. FP-5, Federal Pacific Electric Company, Newark 1, N. J.

FEDERAL PACIFIC ELECTRIC COMPANY

FPE

growth through creative energy

For more facts circle 591 on Reply Card

PLANT ENGINEER'S PICNIC

It's amazingly simple to design a complete Stromberg-Carlson sound communications system from easy-to-assemble components.

No soldering, no special cabling—everything fits together beautifully. Choose from Stromberg-Carlson's extensive line of quality-engineered, standard "building blocks," and obtain precisely the top quality sound installation you want—without unwanted "packaged" extras. And there's no need to fear system obsolescence with Stromberg-Carlson standardized components. Add additional features, additional stations at any later date with the same ease with which you built the initial equipment.

Two vital points. Stromberg-Carlson's rigid inspection and quality control assure you of minimum maintenance and service requirements. Stromberg-Carlson has by far the largest team of sound experts throughout the U.S., always ready to give you immediate and continuous personal attention.

For information and literature write:
Commercial Products Division,
1415-09 North Goodman Street,
Rochester 3, New York

* Wide choice of pre-amplifiers and amplifiers ranging from 3 to 250 watts output.
* Flexible Dial-X® Private Internal Telephone Communications which can be tied to your paging system.
* "Key-municator"—Loudspeaking Intercom System—beautifully styled for the executive desk.
* Pagemaster® Selective Wireless Paging System provides instant personal contact with the man on the go.
* A complete line of indoor and weatherproof outdoor paging, talk-back and hi-fi speakers.
* A variety of cabinet designs incorporate panels for phono, tape, radio switching, control and power.

STROMBERG-CARLSON
A DIVISION OF **GENERAL DYNAMICS**

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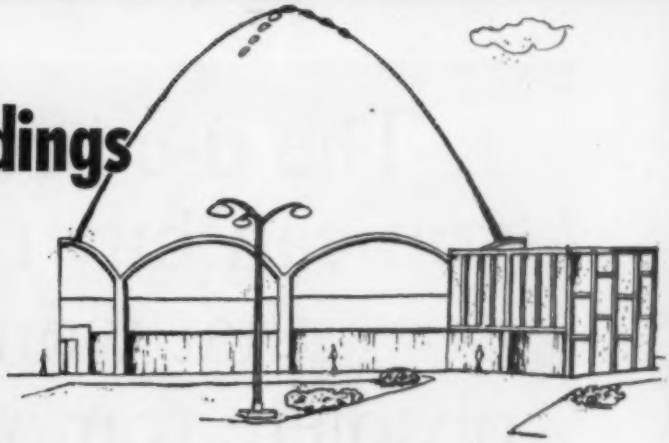
For more facts circle 593 on Reply Card ——→

TRUE GUN-ALL 'grows' buildings with Gates Industrial Hose



Ultra-modern free-form buildings like this literally 'grow' on their own reinforcement in True Gun-All's Truecrete wet-mix concreting process.

True Gun-All (Division of Detroit Tool & Engineering Co. of Lebanon, Missouri), is one of many hundreds of manufacturers who rely on Gates Industrial Hose to help insure the dependability of their own products on the roughest, toughest jobs.

Wherever you need hose—to carry air, water, chemicals, concrete, oil, or anything that flows—you too can rely on Gates. For complete information on Gates Industrial Hose, see your Gates Distributor. You'll find him in the Yellow Pages—or you can write

The Gates Rubber Company Sales Division, Inc., Denver, Colorado

TPA 501

Gates

The Mark of *Specialized* Research

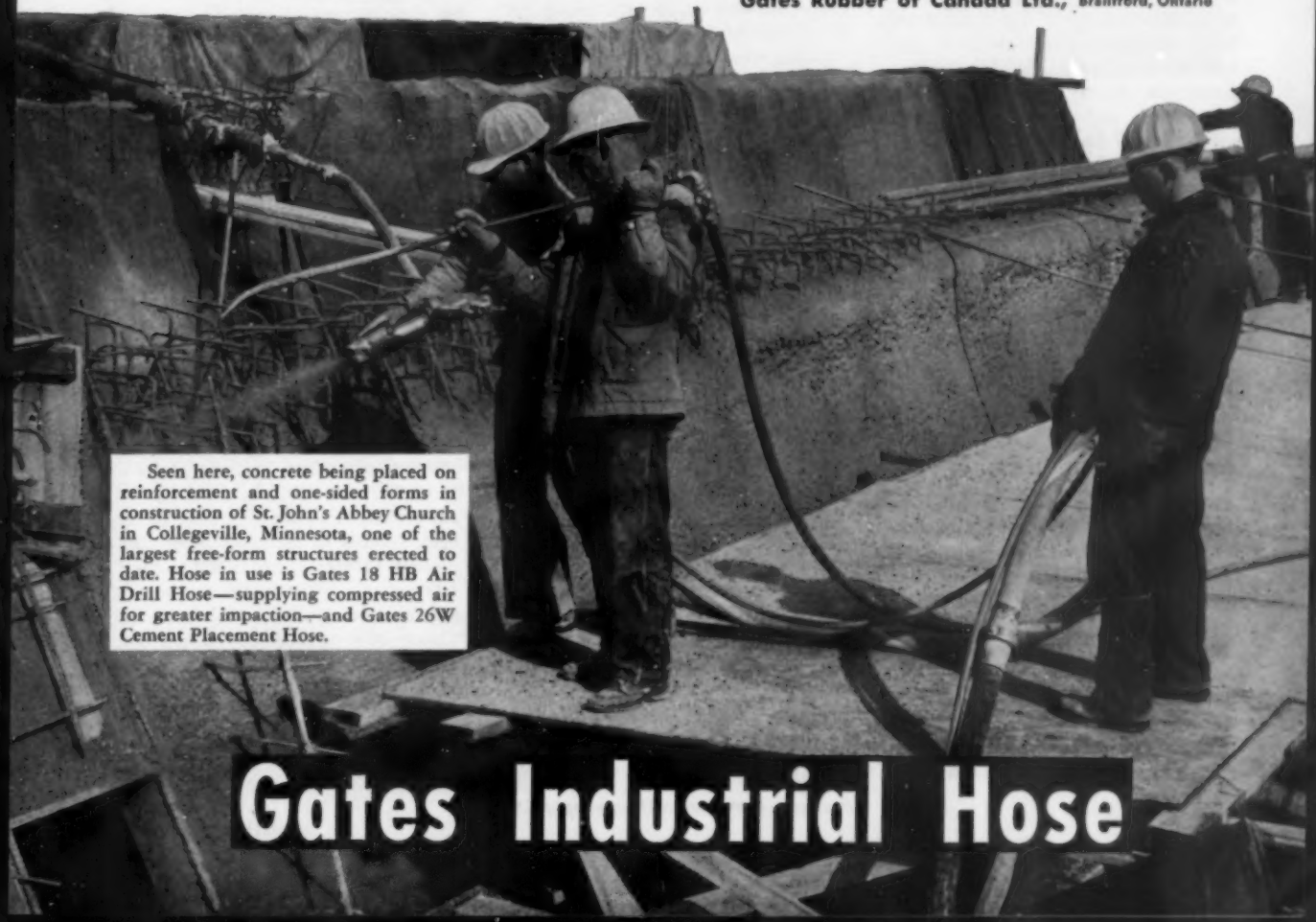
Gates Premium Quality Air Drill Hose—18 HB

High grade gum rubber, virtually scuff-proof. Resists sun and weather without checking or cracking. Never chips or plugs up air lines or equipment.

Gates Cement Placement Hose—26W

Specially built for conveying wet concrete and grouting mixtures under pressure. Ideally suited for flexible connections on cement pipe lines.

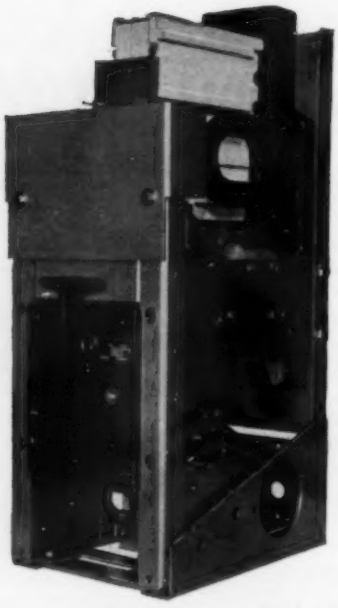
The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



Seen here, concrete being placed on reinforcement and one-sided forms in construction of St. John's Abbey Church in Collegeville, Minnesota, one of the largest free-form structures erected to date. Hose in use is Gates 18 HB Air Drill Hose—supplying compressed air for greater impaction—and Gates 26W Cement Placement Hose.

Gates Industrial Hose

The d-c breaker you can buy today that won't be obsolete tomorrow



Stationary type single-pole FB breaker in 1200 amp rating with manual stored energy closing.

Actually this new-design model FB circuit breaker from I-T-E is somewhat of a phenomenon in its field. Of all breakers available for direct current, this is the only one that really makes use of today's modern materials and up-to-date knowledge of circuit breaker design. You might say it's the only modern d-c circuit breaker on the market today.

HIGH SPEED

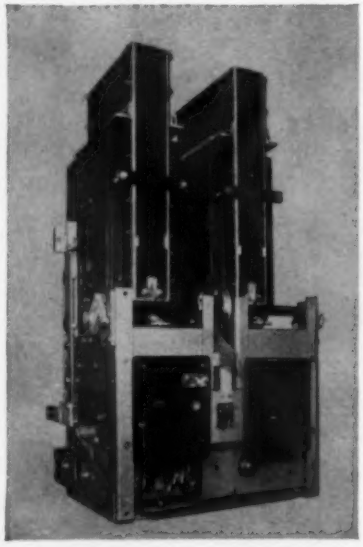
In today's high-capacity d-c circuits, you *need* a high-speed breaker. Otherwise you risk thermal or mechanical damage to equipment—such troubles as commutator flashover in rotating equipment or arc-back damage to your rectifiers. Many circuits today still have semi-high-speed breakers that don't give adequate protection. At the time they were installed they may have been the best available. Or else high-speed breakers were too expensive. That isn't true with the FB. Without paying a premium price, you get high-speed operation. Current limiting action occurs *within 6 milliseconds*. And the breaker may be safely applied to 1000 volt d-c circuits having a rate of rise of 15 million amperes per second. So the FB breaker can be used with confidence in practically all d-c circuits.

COMPACT SIZE AND LIGHT WEIGHT

Probably the most obvious difference between the new FB breaker and some of the old-design models still being sold is the greater compactness. This is one of the direct results of modern materials and technology. I-T-E engineers have given you actually superior circuit protection in less space. And the use of modern materials has shaved off many pounds of weight. Because of this they are now available in general-purpose enclosures. In addition, such new-design details as tilting arc chutes, elimination of flexible connectors, and exclusive drawout construction make this the easiest-to-maintain d-c circuit breaker you ever saw.

AVAILABLE IN 1 OR 2 POLES

If you are operating a single-wire grounded system, a single-pole circuit breaker arrangement will suffice. But suppose you are operating a 2-wire, ungrounded system. Then a 2-pole circuit breaker is desirable. And only the I-T-E model FB offers it. This is real 2-pole construction, with both poles fully integrated mechanically and electrically for simultaneous opening and closing under all conditions.



Drawout type 2-pole breaker in 6000 amp rating, electrically operated.

REALLY FUNCTIONAL MECHANICAL ADVANCES

Who but I-T-E would be first to give you an advance such as manual stored energy closing in a d-c circuit breaker? No slow burning of contacts with the FB. It closes in roughly 1/12 to 1/6 second for greater safety and longer contact life. You have your choice of either manual or electrical closing. The motor-operated closing mechanism draws only 5 amperes—a great advantage over the usual 50 amperes required by solenoids. Precision construction typical of I-T-E equipment, coupled with drawout design, permits complete interchangeability of breakers and parts in breakers of equal rating.

REPLACE NOW

There's questionable economy in trying to stretch out the life of old equipment that can mean costly downtime and inadequate protection. The wiser move is to replace now with new-design model FB breakers that are far ahead of the field. Models in capacities from 1200 through 12,000 amperes continuous and 1000 volts d-c. Write for the new detailed and illustrated Bulletin 4601-1A. I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY

For more facts circle 594 on Reply Card

The most efficient compressed-air-line filter you can buy...

New, perfected-design Norgren Air-Line Filters give you these benefits:

1. Complete liquid removal.
2. Highly effective removal of solids.
3. Choice of 4 interchangeable filter elements to best suit your requirements—5, 25, 64, 74 microns.
4. New, stronger transparent bowl.
5. Larger bowl capacity and larger quiet zone for trapping collected liquid.
6. Improved baffle design prevents return of liquid to air line.
7. Quick, easy cleaning—no tools needed—only 4 parts to handle.

Where safety regulations require protection for bowls *from external physical damage—a removable metal bowl guard is available.*

Founded in 1926

C. A. NORGREN CO.

3443 SOUTH ELATI STREET
ENGLEWOOD, COLORADO

Norgren Filter removes all liquid from compressed air

The improved design of the new line of Norgren Filters provides a greater than ever liquid removal efficiency—removing all liquids over the entire range of recommended air flow. Removal of abrasive solid particles is also highly effective.

New, stronger transparent bowl is an important feature of the new filters. This bowl has a higher safety factor than ever before and a much greater resistance to fatigue.

The bowl has a larger capacity for collected liquid. The "quiet zone" below the baffle holds 53% more collected air-line contaminants—requires less frequent draining.

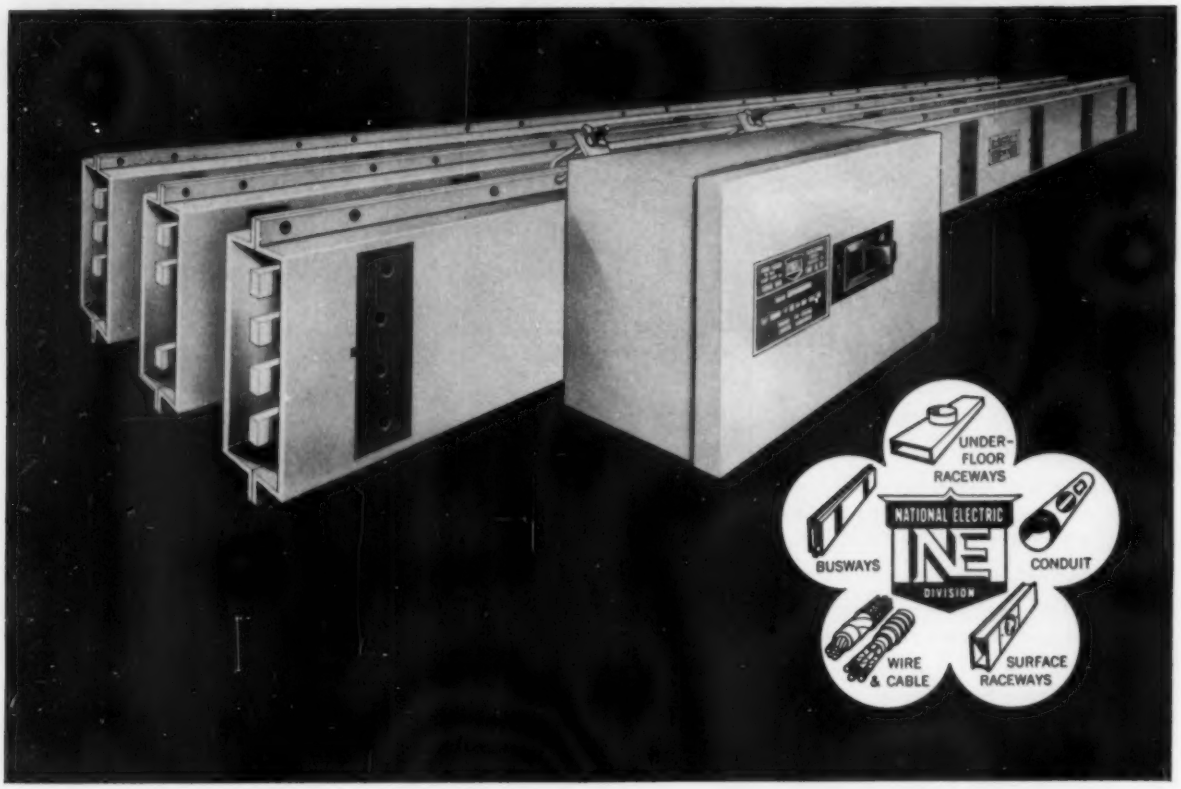
Servicing is easier and quicker. No tools are required to disassemble the filter for cleaning, and there are only four separate parts to handle.

For complete information about the money-saving features of the Norgren complete line of manual drain and automatic-drain filters, call your nearby Norgren Representative, listed in your telephone directory—or **WRITE FOR BROCHURE NA-1.**

For more facts circle 595 on Reply Card

HERE'S A NEW, BETTER METHOD OF ELECTRICAL DISTRIBUTION

N-E 100 AMP SPEEDBUS



"Speedbus," National Electric's new 100 amp busway, goes in so fast, and is priced so low that in most installations it actually is more economical to use than conduit or cable!

Never before has as compact and convenient a distribution system been made available. Never before has such wide application of busway been possible. In almost any commercial or industrial location where both power and lighting are required, this new, completely flexible, factory-assembled busway will serve best.

"Speedbus" can be plugged in from either side, back-to-back—16 usable outlets in every ten foot length. Bolted connections on case and conductor assure positive grounding continuity and electrical contact. Erection of "Speedbus" is simple—using only hand tools. Lightweight sections incorporating aluminum bus bars are easy to lift, and require fewer hangers.

For complete information on how to improve your electrical lighting or power distribution while saving money, call N-E Man, or write for literature. *National Electric Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa.*

NATIONAL ELECTRIC DIVISION PORTER **H. K. PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

For more facts circle 596 on Reply Card

48,000 beer cans an hour are carried on two Wissco Belts through 360°F. drying ovens at Heekin Can Company's Cincinnati plant.

Symbolizing the resources and experience of CF&I, this image is your assurance of the excellence of all CF&I steel products, including Wissco Belts.

FAMOUS NAMES *ride on* WISSCO BELTS

The Heekin Can Company

"Using our CF&I-Wissco Belts, we can achieve high-speed processing, maintain mass production schedules while manufacturing beer cans to essential quality standards," reports Mr. Harold Eichorst, design engineer of the Heekin Can Company, Cincinnati, Ohio, the nation's fifth largest independent producer of metal containers.

"After fabrication," Mr. Eichorst continues, "the freshly lacquered cans are fed onto two Wissco Chain Edge Belts and pass through 360°F. drying ovens. In order to assure even drying, the cans must remain in a vertical position. Because the belts are unaffected by the heat, they stay taut and 100% smooth, with no dips or sagging, and the cans, up to 384,000 every 8-hour shift, pass through without incident. In fact, after the initial installation adjustments, we've enjoyed three years of trouble-free belt service."

What is your belt problem? Corrosion, sanitation, high temperatures, abrasion? CF&I can design and manufacture a belt, in plain, stainless or special alloy steel, that will meet all your requirements. And Wissco engineers can help you with your installation and guiding problems.

The reasons for specifying a Wissco Belt can be best summed up by a user. Mr. Eichorst concludes, "We choose Wissco Belts for durability and long life. We estimate we'll be using these same belts for fifteen or twenty years." For advice on the correct Wissco Belt for your processing and conveying operations, contact your local CF&I sales office.

7560

WISSCO BELTS

THE COLORADO FUEL AND IRON CORPORATION

In the West: THE COLORADO FUEL AND IRON CORPORATION
Denver and Oakland

In the East: WICKWIRE SPENCER STEEL DIVISION — Atlanta • Boston Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

For more facts circle 597 on Reply Card

PLANT ENGINEERING EQUIPMENT®

Edited by M. E. Heniken

PACKAGED BUSWAY is quickly installed, economical

Of 100 amp capacity, Speedbus was designed to afford the flexibility of a true busway system at an installed cost comparable to conventional conduit and wire. System can be quickly relocated, re-routed or extended to meet any production line changes, and is completely salvable, company says. Speedbus is made in pre-assembled sections of packaged 5 and 10-

foot lengths ready to install with simple hand tools. There are 16 full contact, polarized plug-in outlets in every 10-ft length, spaced eight to each side, back to back, and all 16 can be used simultaneously. National Electric Div., H. K. Porter Co., Inc.

▲ For details, circle 1 on Post Card

METAL CEILING PANEL offers economy, easy maintenance

Soundlock is a metal acoustical ceiling panel designed to eliminate room-to-room sound transmission, cost less to buy and install than other metal ceilings, permit flexible room layout and

lighting arrangement; demand almost no maintenance; and last the life of the building. These lightweight panels seal in steel sound with vertical honeycomb cells filled with fibrous glass. Cells are adhered to a solid back surface and a perforated face surface. A textured flat baked-on white enamel provides light reflection and easy cleaning. Standard panels are 2 ft by 4 ft by 1 in.; special sizes are available also. The Kemp Corp.

▲ For details, circle 2 on Post Card

More information on any of this equipment can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 291-292.

SPRAY APPLIED COATING protects against corrosion

Exceptional protection and good weathering, as well as decorative properties and no on-the-job mixing, are announced for Fiberglas Flake Protective Coating, a development of Owens-Corning Fiberglas Corp. It will be available to industrial users in pilot plant quantities. (A spray gun unit for applying it has been developed by the DeVilbiss Co., and trained applicators are available.) The coating is for use where corrosion is a problem, as in storage tanks, jackets for stack insulation, ducting of chemicals, and concrete sewer lines. Also foreseen are use as a liner for concrete flooring and as a water sealant for concrete block and slab walls.

The product is described as a homogenous mixture of Fiberglas Flake, resin, fillers, accelerator and pigment (if desired). According to manufacturer, a 20-mil thick coating has 50 layers of Fiberglas Flake—roughly the equivalent of 50 coats of paint in one application. Use of the flake with resin reinforces the coating by minimizing shrinkage and increasing impact resistance. Sagging of vertical surfaces and crawling are claimed impossible because of the high shear force existing between layers of flake and resin. Pinholes are said to be eliminated by isolation of air bubbles or voids with many layers of flake glass. Surface haze is reportedly no problem. For small areas, the mix can be applied by hand troweling. Owens-Corning Fiberglas Corp.

▲ For details, circle 3 on Post Card

PHOTO RELAYS operate under adverse conditions

Two heavy duty photoelectric relays —Bulletin 5106 Type PL Pulsolite and Type PLJ Pulsolite Jr.—are suggested for use in atmospheres dense with foreign matter and where an extraneous light source could cause false operation in a conventional unit. Relay uses include: door control, conveyor control, intrusion alarms. Also, company states, these relays can be used in the presence of paint spray and to detect position of parts in ovens, kilns, furnaces. Among features announced are extreme sensitivity, and a modu-

lated signal beam which cannot be affected by other light sources. The signal beam must be completely broken to work the relay.

Illustrated is Type PL, showing the receiver (left) control (center) and projector (right). Unit combinations are available for indoor operation at maximum distances of 200, 1000 and 2000 ft, or outdoor service at 100, 500, and 1000 ft. An infra-red filter is available for invisible beam operation —its use will decrease the single beam range outdoors by 50 per cent, indoors by 20 per cent. Type PLJ is for operating under 100 ft indoors, 50 ft outdoors. The Clark Controller Co.

▲ For details, circle 4 on Post Card

ALUMINUM LADDER rolls up for easy carrying

Available in 12- and 16-ft lengths, this aluminum ladder rolls up into a compact bundle which you can carry like a suitcase or stow in the trunk

of a car. The larger size weighs only 24 lb and has a 20-in. diam when rolled. When unrolled and locked into position, however, this ladder becomes rigid and handles like a conventional straight ladder, manufacturer states, and will support a 1000-lb load. Aladdin's Products, Inc.

▲ For details, circle 5 on Post Card

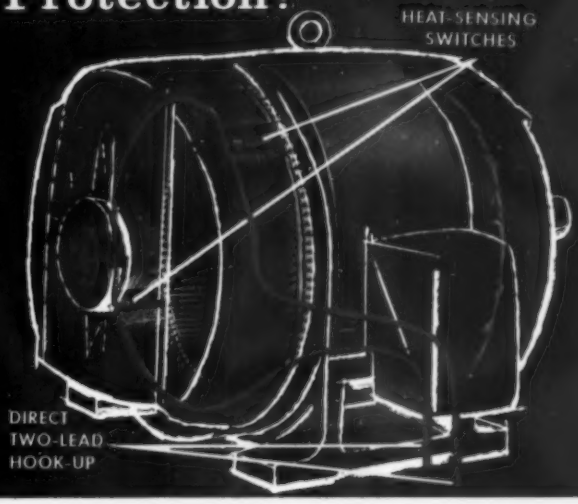
(More Equipment on page 210)

GENERAL ELECTRIC

New Concept in Motor Protection!

Tri-Clad '55' Thermo-Tector

SYSTEM ENDS OVERLOAD BURNOUT!



General Electric offers a *totally new* type of protection on *all* Tri-Clad '55' motors 7½-125 hp!

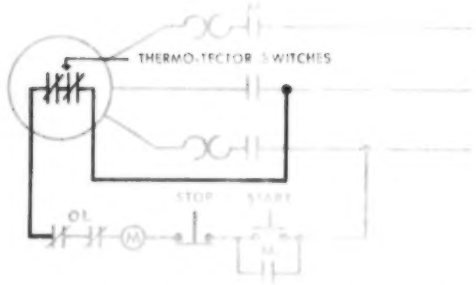
Exclusive THERMO-TECTOR system has heat-sensing switches buried in stator windings. Switches shut off motor *only* when stalls, overloads or other conditions threaten heat damage to motor windings.

Unique THERMO-TECTOR system "anticipation" feature varies motor shut-off point according to rate of winding heat rise. This flexibility allows *maximum motor output* under all conditions.

TURN PAGE FOR FURTHER INFORMATION

NEW Tri-Clad® '55' THERMO-TECTOR SYSTEM

Allows Full Motor Output— No Wasteful "Safety Margin" Needed



Thermo-Tector system needs no costly amplifying relays, connects directly to any G-E motor controller.

You get full output from Tri-Clad '55' motors with Thermo-Tector system. Variable response feature of heat-sensing switches allows motor to operate right up to safe limits under any operating condition.

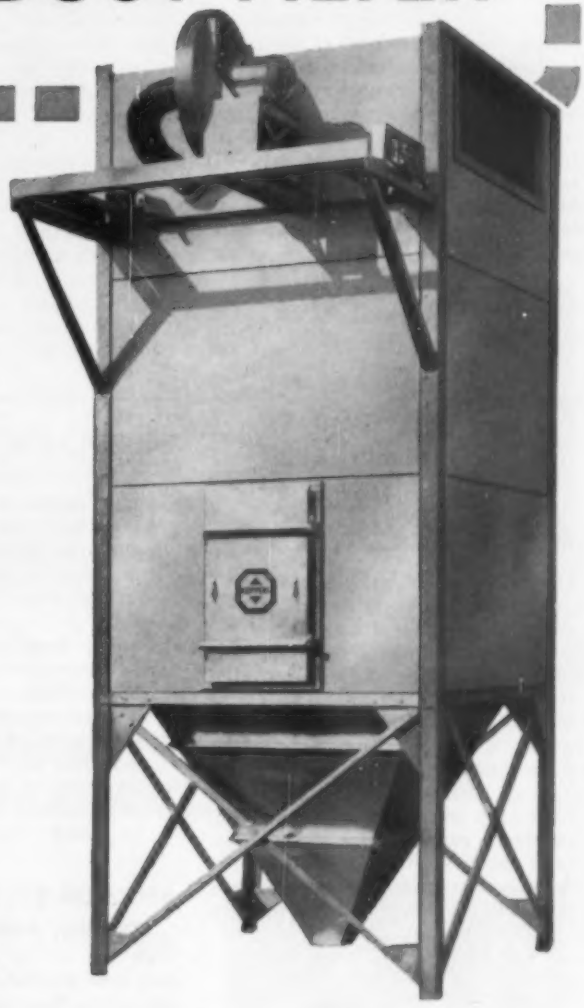
Thermo-Tector switches are offered on *all* Tri-Clad '55' motors in frames 254U-445U. For more information, contact your G-E Apparatus Sales Office or write for Bulletin GEA-7092, Section 866-03, Schenectady 5, N. Y.

SMALL AC MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

Reverse-air jet filtering comes of age with the

NEW KOPPERS MODEL K AEROTURN® DUST FILTER



NEW PERFORMANCE

Highest filtering efficiency and increased capacity are benefits you get in the all-new Model K Aeroturn. Fifteen years of diversified application experience have combined to produce a dust filter offering the utmost in performance and reliability.

NEW ECONOMY

Revolutionary new self-adjusting blow rings and proven pressure controlled filter cleaning reduce wear — increase filter tube life — cut operating expense. Rugged, simplified construction virtually eliminates maintenance costs and downtime.

NEW FEATURES

Koppers Model K Aeroturn has been completely redesigned for demanding industrial service—the only new reverse-air jet filter on the market. Such features as new blow rings, new carriage drive system and simplified, standardized design help you recover more product, cost less to operate and serve you more dependably.

NOW, MAIL THIS COUPON for complete information!

KOPPERS

AEROTURN® DUST FILTERS

Engineered Products Sold with Service

KOPPERS COMPANY, INC., Dust Filter Dept.,
4209 Scott Street, Baltimore 3, Md.

Gentlemen: Please send me a free copy of your new Aeroturn brochure complete with descriptions, drawings and photographs.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

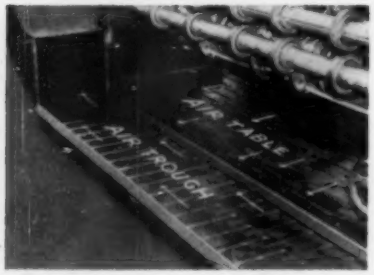
For more facts circle 599 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

CONVEYOR moves material fast—by air stream

Jetstream is a conveyor system designed to move material at speeds up to 2000 fpm on a cushion of air. It has a level load capacity up to 30 lb per square foot, depending on materials conveyed, and operates at inclines to 45 deg. Manufacturer points out that Jetstream can be installed or built in and around machinery, or wherever space and safety factors preclude use of moving bed conveyors.



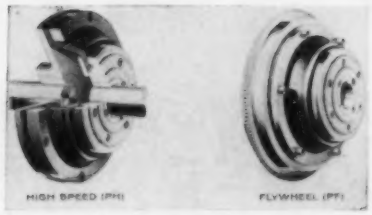
Operation is achieved by metering low-pressure air through louvers, which direct an air flow along the carrying surface. Light material, such as sawdust and chips, can be conveyed without blowing above the lip of the trough. Material floats quickly but gently, it is stated. The conveying air temperature can also be varied for cooling, heating or drying. Permanent hold-down mountings are claimed unnecessary except where caution dictates, as there is no vibration. The troughs can double as access walkways or platforms and can be made portable. Engineers Associated.

▲ For details, circle 6 on Post Card

SYNTHETIC BELTING resists oil and grease

Suplex is an all-synthetic flat belt designed to retain its coefficient of friction, even when large quantities of oil or grease are present. The belting is an oil-resistant version of company's plastic belting and said to feature freedom from stretch, high strength and durability. According to company, it can be readily joined by a simple heat sealing method without lacing or sewing. R & J Dick Co., Inc.

▲ For details, circle 7 on Post Card



FLEXIBLE COUPLINGS for high speed, high torque use

Para-flex High Speed and Para-flex Flywheel Couplings feature a pen-shaped rubber flexing element. They are designed to operate at higher speeds and to transmit greater torque than company's original Para-flex Couplings (which have a tire-shaped flexing member of cord and rubber construction) and to extend the practical applications of Para-flex. Like the standard units, both new types are designed to accommodate, angular and parallel shaft misalignment and end float, to absorb torsional vibration, and to cushion shock loads.

In the High Speed Para-flex, the flexible member is supported on one side of a clamp-ring flange; the larger side is bolted to a steel disc. Both flange and disc have Taper-Lock bushings for easy mounting on shafts. For speeds up to 5230 rpm, this coupling may be used with electric motors or internal combustion engines to operate hammer mills, compressors, pumps, high speed fans, blowers and is claimed equally efficient on low-speed applications with high torque requirements.

The Flywheel Para-flex is similar, except that its larger side bolts directly to the flywheel of an internal combustion engine. It comes in sizes to fit bolt circles of most standard SAE flywheels up to 19¼ in. diam. Flexing members of both new types absorb noise-producing vibrations and serve to prevent flow of electrical current between shafts—there is no metal-to-metal contact and no lubrication is required. The new couplings come in sizes to deliver up to 47 hp per 100 rpm, to fit shafts up to 4 in. diam. Dodge Mfg. Corp.

▲ For details, circle 10 on Post Card

WIDE PLASTIC SHEET for tank linings

Extruded Penton sheet in 48-in. width rolls is offered for lining tanks, vessels and other equipment. It is pointed out that these extra-wide rolls reduce application costs because more surface area can be covered with a single width—fewer seams, less welding time. Penton linings have a broad range of chemical resistance at elevated temperatures. Two standard sheet thicknesses are available: 0.40 in. and 0.062 in., the heavier designed for conditions of severe abrasion. National Vulcanized Fibre Co.

▲ For details, circle 8 on Post Card

ANCHOR BOLT holds the large presses, heavy machines

With this flexible and retractable anchor bolt and well, there is no projection above floor surface. The anchor bolt is dropped to the bottom of the well. Just before equipment is located the plywood cap at the top of the well is removed, permitting bolt to be moved ½ in. in any direction. After equipment is positioned, the bolt is moved under the bolt hole and pulled through it by inserting a ¼-in. bolt into the tapped hole in the bolt. After placing a nut on the anchor bolt, the ¼-in. locating bolt is removed. The rectangular shape of the well and bottom plate serve to keep anchor bolt from turning. Paton-Reynolds Co.

▲ For details, circle 9 on Post Card

POWER CLEANING GUN costs little, works fast

Trig-Away Gun—priced around $20.00—operates from any compressed air line to power-clean engines, motors, truck bodies, machinery, lube equipment, even walls and floors. It cleans, rinses and dries at a touch of the finger. Because of the speed and

simplicity of this steam cleaning tool, the time required to clean an average truck engine or punch press with it is just 10 min, according to manufacturer. The gun can also be used to spray paint, insecticide, solvents, steam etc.

In operation, a brass air jet in the gun nozzle picks up a small amount of cleaning solvent which is automatically mixed with compressed air for power cleaning by spraying. After the solvent soaks into the grease and grime, Trig-Away blasts the object with a warm or cold water spray, it is explained; then the gun's trigger action power dries the surface. A water-soluble, non-caustic grease emulsifier, Chemi-Concentrate, is sold with the

PHYSICAL PROPERTIES	ARMAFLEX 22	BRAND A	BRAND B	BRAND C	BRAND D
LOW DENSITY (less than 7.5 lbs. per cu. ft.)	YES	NO	YES	YES	YES
LOW WATER VAPOR TRANSMISSION (less than .15 Perm)	YES	NO	NO	YES	NO
LOW WATER ABSORPTION (less than 3% by volume—28 days)	YES	NO	NO	YES	YES
DIMENSIONALLY STABLE AT 200° F. (less than 5% lineal shrinkage—28 days)	YES	YES	YES	NO	NO
DIMENSIONALLY STABLE AT 220° F. (less than 5% lineal shrinkage—28 days)	YES	NO	NO	NO	NO
NEGLIGIBLE ODOR	YES	NO	NO	(?)	NO
SELF-EXTINGUISHING	YES	YES	YES	(?)	YES
OZONE RESISTANCE	YES	YES	YES	YES	YES
SMOOTH SURFACE	YES	(?)	(?)	(?)	YES

Properties evaluated by tests at Armstrong Research and Development Center
(?) indicates results are inconclusive or classification a matter of individual judgment

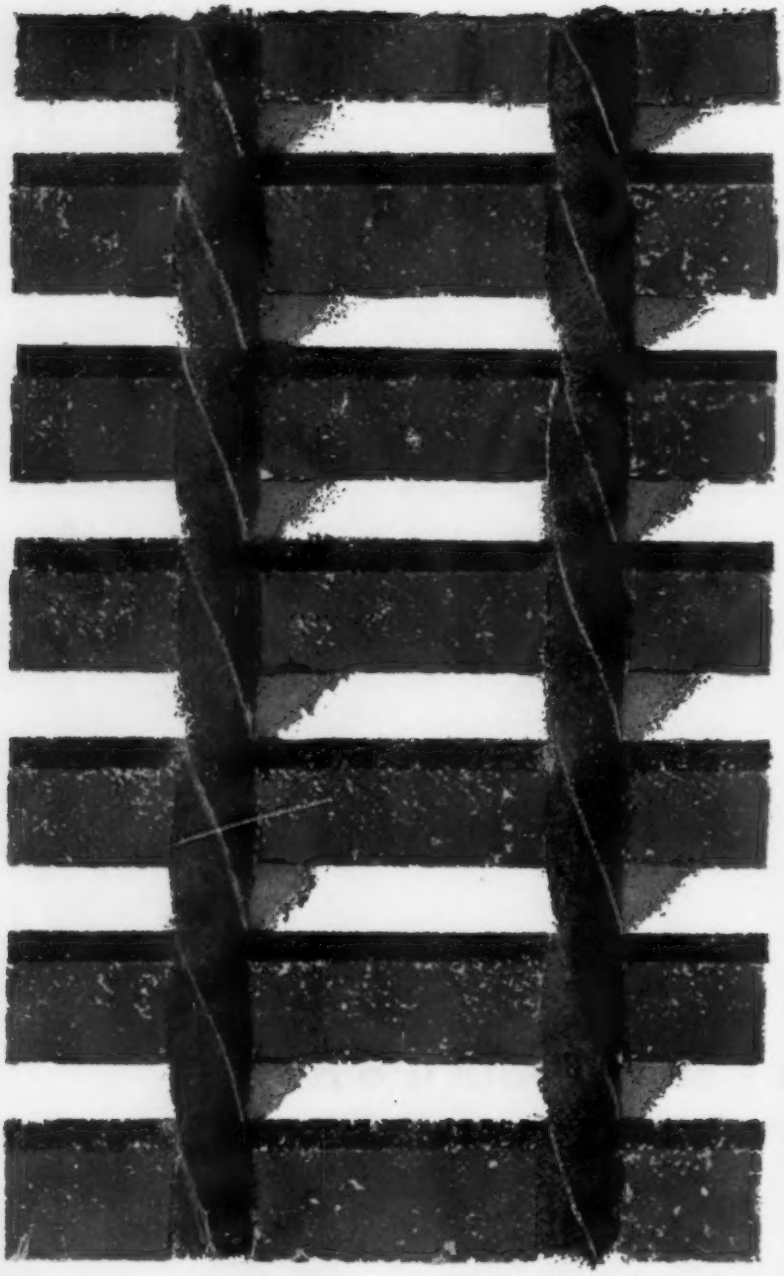
What's better about the new Armstrong Armaflex 22?

This chart tells you at a glance why the improved Armaflex 22 gives superior performance on pipe covering work. New Armaflex 22 features a temperature range from below zero to 220° F.; a super-smooth exterior surface; and greater toughness and durability. For complete information on this fine quality flexible foamed plastic insulation, send for new booklet. Write to Armstrong Cork Company, 2204 River Road, Lancaster, Pennsylvania.

Armstrong INSULATIONS

1860-1960 Beginning our second century of progress

For more facts circle 600 on Reply Card



Blaw-Knox Electroforged Grating solves so many problems for so many industries. Catalog free on request. Write

Blaw-Knox Equipment Division, Pittsburgh 38, Pennsylvania.

BLAW-KNOX

GRATING

For more facts circle 601 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

gun. The gun is chrome plated steel, weighs only 3 lb. Adjustable trigger action controls output of solvent, steam and air blasts. Bulletin T-101 gives information. Bonus Products.

▲ For details, circle 11 on Post Card

JIB CRANE, power rotated, handles loads to 20 tons

Development of this extra-heavy capacity unit with low mounting space requirements, is attributed to use of a new high-strength alloy steel. The crane is designed to permit one-man handling of heavy castings and forg-

ings, machine tools, power units, steel slabs. It is available with jib spans up to 25 ft, and with vertical clearances to 25 ft. Pillar mount type column is 27 by 27 in. All weather design makes this crane suitable for outdoor installation, it is noted and although intended for operation with manufacturer's 20-ton power trolley electric hoist, it can be used with other hoists with standard trolley mounting. Power for 360-deg rotation in either direction with full capacity loads is provided by a high-torque a-c motor. R. G. LeTourneau, Inc.

▲ For details, circle 12 on Post Card

CONVERTIBLE VALVE reduces inventory, spare parts

The P-K Paul Valve can be converted from a manual valve to a control valve or a motor operated on-off valve, it is announced. Conversion of this venturi-ball design valve is made by replacing the bonnet and stem of the manual valve with a new bonnet and stem and a yoke carrying the required topworks. With this valve, for example, a chemical processor can upgrade dead-end service valves and use them for critical temperature and

New! STROBOTAC®

...an Advanced Electronic Instrument for Tachometry and Slow Motion Analysis of Machinery and Cyclic Movement.

This Strobotac is a completely new design based on a unique white-light strobotron tube. Much brighter light — 70 times that of its predecessor — combined with extremely short flash duration reveals operating details of machines and processes. Now you can see in detail the operation of cams, gears, pulleys, linkages, and mechanical parts of all kinds — details you've never seen before.

Improved Contrast — new white light, with an intensity of 4.2 million candlepower on the low-speed range, provides tremendous improvement in viewing conditions.

Pivoting Lamp — rotates 360° in horizontal direction and 180° vertically. Lamp can be aimed at object under investigation while instrument is positioned conveniently for a clear view of calibrated rpm scale.

Long-Throw Beam — the new Strobotron tube produces a concentrated beam of light which is ideal for penetrating into the heart of complex machinery.

Sharp Flash — (1- to 6-μsec duration) "freezes" motion and shows clearly a degree of detail that was heretofore invisible; practically eliminates blur.

Easier to Read and to Use — one simplified dial and range switch controls rate of flash; only the scale to be used is illuminated at a time. Direct reading from 110 to 25,000 rpm.

Speed Range Extended Upward — 25,000 rpm, direct reading; useful to approximately 250,000 rpm. Lower limit 110 rpm, direct reading; lower with external contactor.

Lighter Weight — just 7½ pounds; and only ⅔ size of previous model.

1% Accuracy — permanently assured by panel neon-bulb calibrator; easily checked at a glance.

Unique Carrying Case — provides a convenient, adjustable stand; serves as rugged enclosure for instrument in storage or transit.

Type 1531-A STROBOTAC

$260.

Write for more information

GENERAL RADIO COMPANY

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Village 8-9400

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WASHINGTON, D.C.
Silver Spring
JUniper 5-1088

SAN FRANCISCO
Los Altos
WHitecliff 8-8233

LOS ANGELES
Los Angeles
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IN CANADA
Toronto
CHerry 6-2171

For more facts circle 602 on Reply Card

Cut scaffold erection time, speed any bolt hole line-up with Snap-on SPUD AND RIGGERS WRENCHES

These SNAP-ON spud and scaffold wrenches save time on scaffold setup, steel erection, pipe line-up, many maintenance jobs. They're lightweight and tough with the fit, feel and balance a man needs for work speed and comfort.

A. Ratcheting Spud Wrench

½-in. square drive with lock button

Combines ratchet wrench with long spud end for quick line-up. Ratcheting action lets you select best angle for convenience and leverage. Use it with any ½-in. drive socket or extension. Tool is especially useful wherever bolt holes must be lined up. Over-all length — 14 in. with 8-in. tapered section.

B. Open-End Spud Wrench

Built for tough duty. Eight sizes, ⅞ in. to 1½ in.; lengths from 14⅛ in. to 20 in.

C. & D. Scaffolding Riggers Ratchet and Socket

Combination of special ratchet and socket speeds scaffolding erection and teardown. One-half-inch square drive ratchet is fitted with friction ball and is used with special, extra-deep, ⅞-in. socket that provides ample clearance over bolt. Note oversize reverse lever for quick, easy action even with heavy gloves. The ⅞-in. BOXOCKET® opening on other end is used to tighten down, or to break loose tight nuts — eliminates unnecessary strain on ratchet and socket.

Give your workers the best — SNAP-ON costs so little more to buy, actually costs less in the long run. Order these spud and scaffold wrenches from your SNAP-ON representative now, or write us for the address of your nearest branch. Nationwide SNAP-ON warehouses mean quick delivery on the full line of SNAP-ON wrenches and hand tools.

FOR ALL INDUSTRY

SNAP-ON TOOLS

8068-I 28th Avenue • Kenosha, Wisconsin

For more facts circle 603 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

pressure operations. The valve comes in four sizes from ¼ to ¾ in., with pressure ratings of 1500 and 2500 lb. Standard construction for the manual valve is with inside screw. Automatically operated valves have interchangeable outside screw and yoke construction. General Kinetics Corp.

▲ For details, circle 13 on Post Card

PORTABLE MIXERS for the process industries

Lightnin Mixers are a propeller-type portable units for fluid agitation in process industries. They are designed as an integral unit. Sizes will range from ⅛ hp to 3 hp; a fixed mounting design will also be available in all except the ⅛ hp size.

Manufacturer announces that these mixers offer not only direct-drive

speeds of 1750 and 1150 rpm with higher impeller heads, but also a gear-drive model speed of 350 rpm providing up to 45 per cent more flow than previous units. A feature is a positive drive chuck, permitting fast, accurate coupling in one simple operation. Its location is always above the maximum fluid level of the mixing tank. Standard motors are chemical plant type, ball bearing, either totally enclosed or explosion proof. Company says these require no lubrication or adjustment under normal operating conditions for 5 yr. Mixing Equipment Co., Inc.

▲ For details, circle 14 on Post Card

DOCK RAMP reduces truck loading time

Extendo-Lip is a self-contained loading ramp for both existing docks and new construction. According to manufacturer, the unit comes ready for installation in any prepared dock pit less than 2 ft deep, is secured in place

NEWS YOU CAN USE ABOUT BOILERS

Address inquiries to

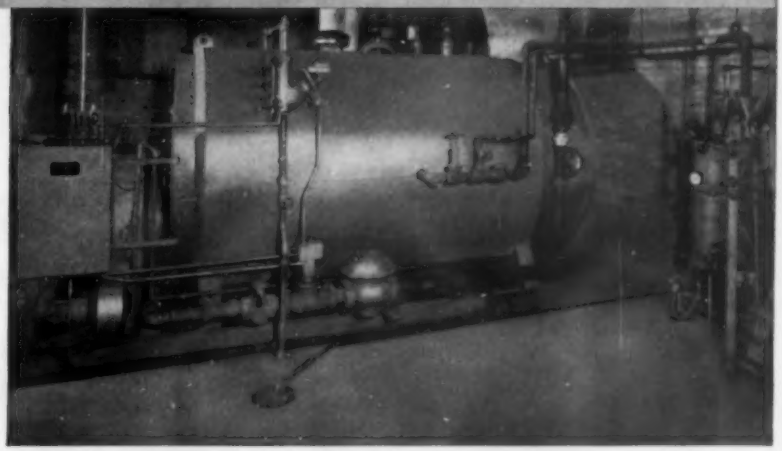
ECLIPSE BOILER DIVISION

MANUFACTURERS RD. & COMPRESS ST. CHATTANOOGA 6, TENNESSEE

Eclipse 3-pass "Steamboilerplant" features new super-safe and ultra-simple gas burner

80% Efficiency Guaranteed

Also available for oil



Repeat orders speak for the efficiency, economy, and reliability of Eclipse "Steamboilerplants" at Mid-West Pak Corporation, Belvidere, Illinois. The 3-pass, 200-hp, gas-fired boiler illustrated is the third Eclipse unit installed in this plant. Ask for bulletins describing Eclipse "Steamboilerplants."

When you need more steam capacity, or need to replace an old boiler (and many plants would be money ahead by doing this), how can you evaluate the advantages and characteristics of the various boilers available to you?

Eclipse believes the primary consideration can be summed up in the word "dependability." That covers a lot of ground. Let's analyze it:

Is the boiler going to be fussy? You can't say it's dependable if it's going to take a crew of experts to operate it . . . to maintain combustion safety and efficiency . . . to adjust it . . . to start it . . . to keep it on the line.

The burner

Eclipse WP (Whispering Power) gas-fired "Steamboilerplants" are equipped with a new Eclipse burner that's the simplest and safest ever. To start it, you simply flip an electric switch — from then on reignition is automatic. A simple, reliable electronic flame safety system, proved in thousands of installations, assures you the ultimate in safety. The blower starts first, purges the combustion chamber before the flame is lighted. The gas comes on at low setting, then up to full fire. It's so smooth that most operators say they can't hear it light!

The adjustments are far less critical than is common. The controls are standard and simple — service is available everywhere.

The boiler

The "Steamboilerplant" itself is true Scotch Marine design. The tubes are completely submerged below the water line, eliminating corrosion due to CO_2 and other gases commonly present in the steam space. Dirt and other impurities settle out at the bottom below the hot furnace — where they will not be baked on as a hard scale. The soft sludge deposit is easily removed by blowdown or through the blowoff opening.

Efficiency

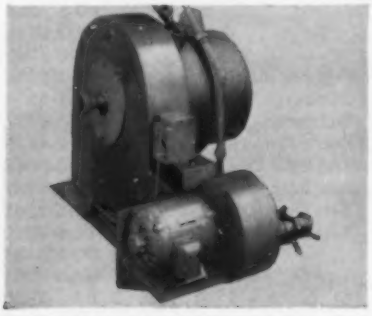
Now, with dependability that enables you to keep your boiler in service 24 hours a day, seven days a week, you naturally are interested in efficiency. The Eclipse 3-pass "Steamboilerplant" is outstanding here, too.

First, the 3-pass design insures that the maximum amount of heat is extracted from the combustion gases before they enter the stack. Then, through use of a large number of 2" diameter tubes instead of fewer large diameter tubes, the Eclipse boiler presents more heat transfer surface. Finally, the boiler shell is heavily insulated.

The net result is a guaranteed 80% efficiency, fuel input (gross heating value of fuel) to steam output at outlet nozzle on the boiler.

If you have an old, unsafe, or inadequate boiler, or need additional boiler capacity, it will pay you to make a point-by-point comparison of the features and advantages of Eclipse "Steamboilerplants" — 80 through 200 hp. They are second to none for safety, reliability, simplicity, efficiency, and economy.

Call your Eclipse representative or write direct for literature. You'll be glad you did. See above address.



Eclipse WP "Whispering Power" burner — safest and simplest there is. Fully automatic, quiet, and vibration-free, is easy to start, easy to adjust — anyone can operate it. Each size is perfectly mated to the Eclipse "Steamboilerplant" which it serves.

Thermokups, produced by Mid-West Pak Corporation, Belvidere, Illinois, are made of expandable polystyrene plastic with high insulation value. Use of these cups is growing by the millions every year. The new Eclipse boiler pictured above helps meet the demand.

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

within 2 hr and can reduce loading time up to 60 per cent. It can be used with overhead or standard doors. This ramp accepts trucks with beds up to 16 in. above or 10 in. below dock level. The lip moves out from 1 to 13 in. depending on distance required to form a bridge between truck and dock. Only 1 in. of the lip need rest on the truck for full support, it is stated, and the ramp can support 20,000 lb in any direction. It's constructed of solid steel weldment of longitudinal, V-shaped girders reinforced with later V-shaped gussets. Dimensions are: length 6 ft, 11 in. to 8 ft; width, 5 ft, 4 in. More information is in Catalog A-107. American Dockbridge, Inc.

▲ For details, circle 15 on Post Card

OPERATORS for remote control of circuit breakers

Designed to permit remote control of Type AB circuit breakers these electrical operators include models with rated control voltages of 120, 240, 480, or 600 v a-c and 125 v d-c. They actuate breakers rated to 100 amp at 600 v in E, EH and F frame sizes. Suggested control applications include

engine generators, battery chargers, lighting, pumps. They can also be used for capacitor-bank switching, as a limited duty motor starter, or as an overload sensing device. Breakers mounted on panel boards, switchboards, or bus duct plug-in units can be equipped with these operators. Mounting holes for the operators are identical in spacing and size to those for the breakers in all three frame sizes, company states, and for back mountings, a pin can be supplied. It is pointed out that an electrical operator does not impair overload protector features of a breaker or prevent manual operation of the breaker. Westinghouse Electric Corp.

▲ For details, circle 16 on Post Card

SAFETY RELIEF VALVES for liquids, gases and vapors

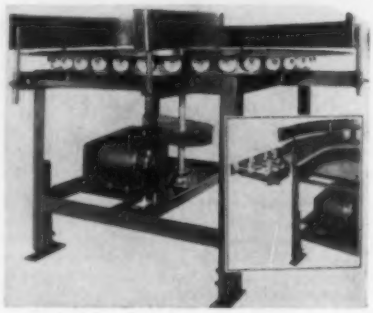
Precise blowdown ring control for gases and vapors, and safety relief for liquids in a wide range of applications where maximum pressure is 300 psi

are announced for valves in the 1870 Series. Featured are a one-piece stainless steel body and stainless steel disc which contains inlet pressure without other joints or gasketing. Valves are available with tungsten steel springs for temperatures to 800 F, with choice of plain cap, packed cap and lever or open lever. Inlet connections include male screwed or 150-and 300-lb raised face flange types. Catalog FE-138 gives full information on the valves. Farris Engineering Corp.

▲ For details, circle 17 on Post Card

POWER TURNTABLE enables turns in small space

With this power turntable, 180-deg turns in conveyor lines within an area of 48 in. or less are claimed possible. The unit has a circular steel plate revolving on a bed of Nylo conveyor wheels. The table is driven by a standard electric motor, and steel guide rails maintain alignment of products through the full turning operation. Entry and departure points can be equipped with wheel or roller spurs for connection with conveyor lines and arranged for any degree of turn up to 180 deg, multiple entry and/or departure points for use in complex systems. According to manufacturer,



The phone number of your nearest Authorized PLEXIGLAS Distributor is in this list:

Atlanta, Ga.	TR-5-7006
	CE-3-3274
Baltimore, Md.	WI-7-4900
Boston, Mass.	AN-8-1900
	WA-3-9800
	NO-7-3500
	EL-4-3001
Bridgeport, Conn.	ED-3-3128
Buffalo, N.Y.	DE-9540
	MA-1873
Charlotte, N.C.	FR-6-8561
Chicago, Ill.	CL-4-4900
	FI-6-7900
	CA-7-0300
	ED-4-8115
Cincinnati, Ohio	DU-1-3010
	PA-1-7911
Cleveland, Ohio	OL-1-1500
Columbus, Ohio	CA-1-3098
Dallas, Texas	RI-7-8597
	RI-7-7044
Dayton, Ohio	BA-2-5891
Denver, Colo.	GE-3-3369
	SU-1-6361
Detroit, Mich.	TO-9-9500
Des Moines, Iowa	AT-2-8477
Ft. Worth, Texas	ED-2-7079
Grand Prairie, Texas	CR-4-7337
Hanover, Pa.	MA-4-7241
Hartford, Conn.	AD-3-9881
Houston, Texas	MI-4-5626
	OR-4-7686
Indianapolis, Ind.	ME-4-4521
Kansas City, Mo.	GR-1-0500
	LO-1-3480
	GR-1-6390
Los Angeles, Calif.	DU-5-3001
	DU-1-3053
Louisville, Ky.	ME-5-2606
Memphis, Tenn.	FA-7-7391
Miami, Fla.	PL-7-2477
	NE-5-5339
Milwaukee, Wis.	BR-6-9700
	BR-3-7032
Minneapolis, Minn.	FE-9-8917
New Orleans, La.	EX-4233
New York, N.Y.	BE-3-7377
	WO-6-4900
	OR-5-1172
	GR-7-5000
Newark, N.J.	MI-2-7413
Philadelphia, Pa.	GL-9-1000
	LO-3-7038
	WA-2-6824
	GA-6-4010
Phoenix, Ariz.	AL-2-1701
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Richmond, Va.	EL-5-5324
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Salt Lake City, Utah	DA-8-0648
San Antonio, Texas	CA-2-9351
San Diego, Calif.	CY-5-8261
San Francisco, Calif.	PL-6-7740
	DO-2-6433
Seattle, Wash.	MA-3-2783
St. Louis, Mo.	MA-1-7900
	JE-1-6372
St. Paul, Minn.	CA-7-7371
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AUTHORIZED PLEXIGLAS DISTRIBUTOR

In just the time it takes to dial the phone, you can obtain complete service on PLEXIGLAS® acrylic plastic. Your Authorized PLEXIGLAS Distributor can serve you with other plastics, too, and a wide range of accessories. He is also qualified to help you with technical and fabrication information. His stocks include almost any size and thickness of PLEXIGLAS in clear, colored, patterned and corrugated sheets, plus rods and tubes. Call the number listed at the left, in your nearest city. You will be connected with *your best source of service on plastics.*

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

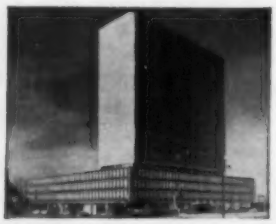
In Canada: Rohm & Haas Co. of Canada, Ltd., West Hill, Ontario

For more facts circle 605 on Reply Card

you can design for 100% air recirculation

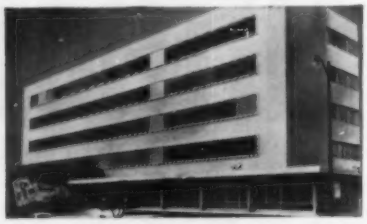
It's being done every day, with Barnebey-Cheney activated charcoal to purify recirculated inside air. And the savings in heating and cooling costs, as well as reduced initial investment, are substantial. You may, of course, bring in outside air for pressurization or design for less than 100% recirculation for specific reasons. Write today for Bulletin T-323. Barnebey-Cheney, Columbus 19, Ohio.

Business increased when this savings and loan company freshened the air in its formerly musty deposit box vaults.



High velocity system handles 87,000 cfm; 74,000 cfm is recirculated, 40% through B-C filters, at Houston Medical Towers.

$12,000 was saved in heating installation for this church and school; heating costs cut $1,650 per year, with B-C filters.



B-C permitted reducing outside air intake to 5% in this California Teachers Association building, Los Angeles.

Over 200 B-C filters handle 218,000 cfm in conjunction with electrostatic filters at this Dallas auditorium.

The characteristic aroma of a veterinary hospital is missing from this one, thanks to B-C activated charcoal.

activated charcoal air purification

Barnebey Cheney

For more facts circle 606 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

this turntable will cost considerably less than installations of power belt or live roller curve sections effecting the same turn and will occupy less floor space. Standard units feature a 48-in. table. Metzgar Conveyor Co.

▲ For details, circle 18 on Post Card

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 291-292. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

D-C POWER SUPPLIES are self-protecting units

Convection cooling, self protection and fewer components are among advantages announced for this standard line of 30 precision-regulated transistorized d-c power supplies. Reduction of required components by about 25 per cent is attributed to improved circuitry and design. For static operation, the units feature convection cooling to reduce maintenance requirements and

provide quieter operation with no difference in noise level between on and off. Incorporation of a "constant watts" circuit serves to protect against overloads, short-circuits, misadjustments and high line voltages. This circuit measures both volts and current dissipated in the transistors. When an overload or fault occurs, the supply is automatically turned off, manufacturer states, and recovery is instantaneous with no reset required, since the circuit resets itself.

Elimination of variable auto-trans-

all around the plant...

ALZAK HIGH-BAYS
100% Downlight.
30°, 60° or 90° Beam

MERCURY VAPOR HIGH-BAYS
100% Downlight
15% Uplight

GLASS-ALZAK DIFFUSER
10% Uplight—Soft
Diffusing Downlight

ALZAK ALUMINUM
REFLECTOR UNITS

EFFICIENT
PERMANENT

ALZAK HIGH-BAYS
15% Uplight. 30°
60° or 90° Beam.

ALZAK LOW-BAYS
Modern, Chip-Proof
Aluminum—Efficient,
Permanent

ALZAK DEEP-BOWLS
70° Beam—
30° Light-Cutoff

"GUTH BRASCOLITE
the Number One line for all incandescent lighting applications."

NEW

Guth brascolite
INDUSTRIALS
for Incandescent and Mercury-Vapor Lamps

High ceilings...low ceilings...large production areas...small laboratories. Each presents a special lighting problem in the modern industrial plant—and the new Guth Brascolite line offers an Alzak aluminum fixture for each.

Illustrated are several Brascolite industrials designed for specific applications. These of course, represent only a small percentage of the complete Brascolite line—the industry's most comprehensive and flexible selection of incandescent lighting equipment, with a fixture for every special need.

Send for Guth Brascolite incandescent lighting catalog—a complete working tool with Lighting Curves, Interflection Coefficient Tables and Formulae for Lumen and Point-by-Point Data. A real tool for every lighting engineer.

THE EDWIN F. GUTH COMPANY.
2615 Washington Blvd. • St. Louis 3, Missouri

For more facts circle 607 on Reply Card

PLANT ENGINEERING EQUIPMENT

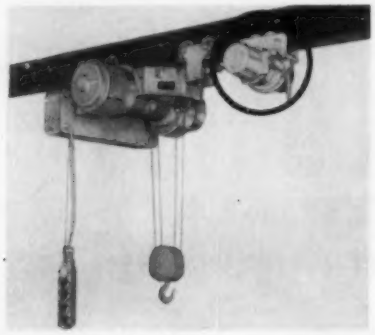
(Begins on page 206)

formers and relays has reduced both weight and size of the units. Priced from $350 to $1100, they are designed for laboratory, test and original equipment applications where there is a need for constant output regardless of demand on the power supply. The units consist of power transistors, silicon rectifiers, alumalytic capacitors and three printed circuit boards: two, which are interchangeable between units, and the new "constant watts" board, which is interchangeable with each rating. Units also include an ammeter and voltmeter, on/off switch, a-c pilot light, a-c fuse line and voltage adjustments. Output voltages range from 1.5 to 100v. General Electric Co.

▲ For details, circle 19 on Post Card

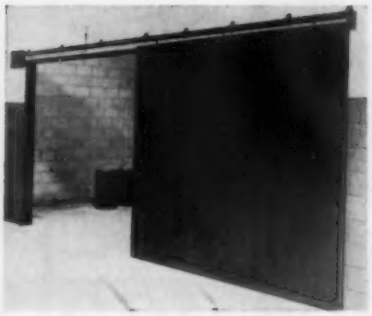
HOIST-TRACTOR is powerful monorail unit

Loads up to 13,000 lb can be pulled at speeds to 60 fpm with the P&H Pull-a-Hoist, says manufacturer, and lighter loads can travel proportionately faster—a 6000-lb load at 130 fpm. The unit is designed to power any make of hoist along any standard I-



beam or wide flange beam. Convenience of installation is a major advantage. P&H Pull-a-Hoist weighs only 83 lb, needs no engineering, requires 12 in. of headroom, and uses only 13 in. of rail space for "end approach." Operating features announced include adjustable torque brake and "soft-start" motor to minimize any tendency of load jerking or swaying regardless of load size. The unit is available with one or two speeds; with separate push-button controls, or with integrated hoist-and-tractor control. The standard model is single-speed, 220-v, three phase, 60-cycle. Bulletin H-63 describes it. Harnischfeger Corp.

▲ For details, circle 20 on Post Card



FIRE DOOR with design and performance advantages

Streamlined appearance and improved safety and performance are announced for the Model SL Sliding Pyrodor. According to manufacturer, a Single Slide Model SL Pyrodor is UL approved for label service—Class A, 3-hr fire test rating plus lowest heat transmission ratings, temperature rise 250 F maximum in 30 min. The door has a solid mineral core construction with heavy gage zinc coated and bonderized steel bonded to the structural core to provide a smooth, flush over-all door surface and resistance to corrosion. Sectional interlocking panels, designed for quick field assembly, simplify installation and shipping. Door hangers and guide rollers are concealed. An automatic release is provided on the door closer to close the door in the event of fire. This mechanism eliminates conventional rope, sheave and traveling counterweight hook-ups. Catalog DHSL-60 gives data. Dusing and Hunt, Inc.

▲ For details, circle 21 on Post Card

COMPACT STARTER for low-horsepower jobs

Designed to cut costs and save space on low-horsepower jobs, this NEMA Size 00 starter is rated from ¾ hp

110 v to 2 hp 440/550 v for three-phase service. Featuring easy inspection and maintenance, starter has straight-through wiring, pressure wire terminals, molded coil and one-piece

How safe are Fire-Resistant Fluids

INSIDE your pumps?

Depends on whether your fluids are *fortified* to provide more than just fire-safety. The pump parts above were subjected to the most rigorous pump tests yet conducted on Houghto-Safe fluids by the Houghton Research Laboratories. Results prove conclusively that Houghto-Safe fluids offer a unique combination of fire resistance and lubricity. Pump wear in every test was extremely low—comparable in many applications to that with premium oils.

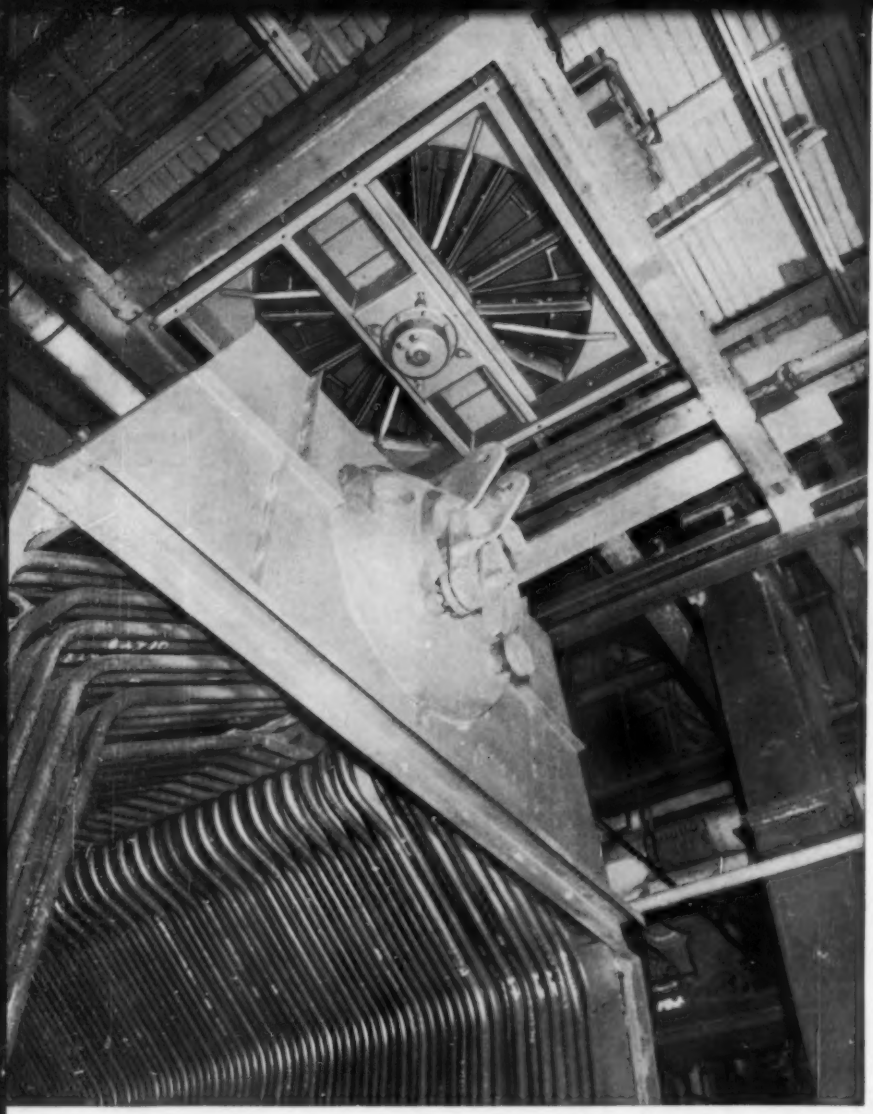
Houghto-Safe fluids are *fortified* to give you much more than fire-safety. Lubricity, oxidation stability, and rust preventive characteristics are built-right-in to make Houghto-Safe the finest fire-resistant hydraulic medium you can buy. And when you buy from Houghton you get *complete* hydraulic service from the only manufacturer who offers all types of fluids (Water-Glycol, Phosphate-Ester and Emulsion Types) *plus* compatible packings for any industrial hydraulic system.

FREE! 48-page Handbook of authoritative and helpful information on selection and application of fire-resistant hydraulic fluids and compatible packings. Write E. F. Houghton & Co., 303 W. Lehigh Ave., Phila. 33, Pa.

Industry's Partner in Production

E. F. HOUGHTON & CO.

Philadelphia, Pa. • Chicago, Ill. • Carrollton, Ga. Detroit, Mich. • San Francisco, Calif. • Toronto, Canada



The Ljungstrom Air Preheater at the B. F. Goodrich Company Shelton Plant is installed directly over the 65,000 lb/hr Wickes boiler. Flue gas leaving the boiler at 615°F passes through the circular rotor, which absorbs the heat and releases it into the incoming air. Preheated combustion air improves combustion, makes fuel burn cleanly. This Package Air Preheater was factory-assembled, and requird only 100 manhours to install.

At B. F. Goodrich Co.'s Shelton Plant

Air Preheater boosts combustion air temperature 345°F... gives 6% more thermal efficiency

"Only a Ljungstrom® Air Preheater, with its continuous regenerative principle, could meet our requirements", says A. G. Sandomirsky, Manager of Engineering at the B. F. Goodrich Company, Shelton, Conn., plant. "We produce foam rubber 24 hours a day, five and six days a week. With an Air Preheater we can meet process steam requirements more economically, and an Air Preheater helped us to justify the installation of high efficiency, high pressure equipment for by-product power generation."

Here's why the Shelton plant meets its requirements best with a Ljungstrom Air Preheater:

1. Ljungstrom is the most efficient heat exchanger you can buy. The Ljungstrom rotor revolves continuously through the flue gas and incoming air, thus absorbing heat and releasing it *from the same surface*. Since the heat doesn't have to pass through anything, each inch of rotor surface is as efficient as one foot of a tubular recuperator.

2. Ljungstrom is the most reliable heat exchanger you can buy. All heat exchange elements pass through the entire air and gas streams. The temperature of the elements in the coolest region – where fresh air enters – is actually an average of the gas and air temperatures, so it's consistently higher than the coolest point in a recuperative heat exchanger. Result: no cold spots, less chance of moisture formation.

3. Ljungstrom is easiest to maintain. You can inspect it – and clean it–while it's running. Heat exchange elements are divided into modular baskets that can be replaced individually without disturbing the other elements. You can even reverse the elements if the surface has thinned on one edge, effectively doubling the life of the heat exchange surface.

For more information on the Ljungstrom continuous regenerative principle, or on the Air Preheater that meets your requirements, phone MUrray Hill 2-8250 or write to The Air Preheater Corporation.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

For more facts circle 609 on Reply Card

PLANT ENGINEERING EQUIPMENT

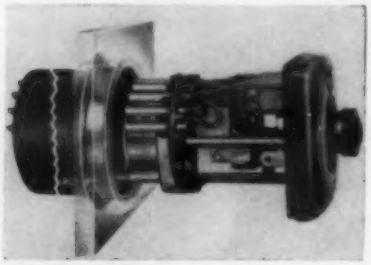
(Begins on page 206)

melting alloy overload relays. It is available open or in NEMA type 1 enclosure with optional pushbutton or selector switch in the cover. Bulletin SM-297 gives data. Square D Co.

▲ For details, circle 22 on Post Card

PLUG-IN DIAL TIMER has safety, conversion features

Because of its ease of replacement this timer is claimed particularly suitable for processing operations in which downtime is costly. Using the basic design and configuration of company's Type 305 Atcotrol Timer, this plug-in model uses a keyed guide-pin for safety and convenience. The pin,



which aligns the timer in the case, protrudes through the rear of the plug-in terminal block on the housing, and is drilled to take a snap-in cotter pin clip. In addition to providing secure engagement, this feature offers a safety precaution without impeding quick removal and replacement.

The timer is available for a-c or d-c operation. Dial ranges from 15 sec to 60 hr are available for 115 v 60 cycle; those of 30 sec to 240 min for 48, 125 and 250 v d-c. A-c ratings of 115 v 50 or 25 cycles; and 230 v, 60, 50 or 25 cycles, are available at higher cost. A front mounting cap can be had. Also available for Type 305 Atcotrol Timers already in operation is a field conversion kit which enables these units to be converted to plug-in convenience. Automatic Timing & Controls, Inc.

▲ For details, circle 23 on Post Card

SYNTHETIC OIL for low temperature uses

Anderol L-423 is designed for extreme low temperature applications such as chart drives, clock movements, instruments. The light viscosity diester oil features a pour pint of below 105 F and a viscosity at 90 F of 5,000 C's. These properties combine with good

on

Faultless Casters

GENERAL DUTY SERIES 100 CASTER
LIGHT DUTY SERIES 400 CASTER
MEDIUM DUTY SERIES L900 CASTER
HEAVY DUTY SERIES H900 CASTER
EXTRA HEAVY DUTY SERIES 1300 CASTER

Eliminate costly, one-at-a-time handling methods with Faultless Casters! Parts—even heavy ones—can be stacked high on Faultless Casters, ready for further processing. Fully loaded Faultless Castered trucks, carts, dollies, racks roll easily, smoothly . . . carrying your products from machine to machine, around corners, down narrow aisles, even outdoors. And products stocked on Faultless Castered equipment require minimum rehandling for packaging, or shipping. Faultless engineers a complete line of precision casters to meet your specific requirements.

ASK YOUR DISTRIBUTOR. Your nearby Faultless Industrial Distributor and the local Faultless Sales Engineer will work with you to eliminate costly one-at-a-time handling methods at your plant.

Casters illustrated are typical of complete range of load capacities and types available for every materials handling job.

NOELTING Faultless Casters

Faultless Caster Corporation

Evansville 7, Indiana

Branch Offices in principal cities; see the Yellow Pages of the telephone book under "Casters." Canada: Stratford, Ontario

For more facts circle 610 on Reply Card

JF SERIES

EASY SAFE EFFICIENT LIFTING!

IT'S EASY to raise or lower loads while pulling a trolley mounted Coffing Quik-Lift Electric Hoist. The pistol-grip control station and the combination strain cable and control cord makes this possible. The light but strong aluminum housing provides ease of portability. Changing voltages, limit switch, type of suspension or chain is quick because the housing is in sections.

FOR SAFETY the control station is made of non-conducting plastic in which the voltage is reduced to 115 volts and the push-buttons are interlocked. The V-type brake which provides maximum braking surface and positive control of loads is another safety measure.

FOR EFFICIENCY this hoist has been designed to bring heavy-duty performance plus durability to the portable hoist field. It will pay you to specify Coffing Quik-Lift. Twenty models—capacities range from ¼ to 2 tons. Ask your distributor for details or write for Bulletin ADH-65.

COFFING HOISTS

DUFF-NORTON COMPANY

COFFING HOIST DIVISION • Pittsburgh, Pa.

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

For more facts circle 611 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

oxidation stability and low evaporation to produce a lubricant that meets the requirements of low starting and running torques over a temperature range of-100 to 250 F. It is compatible with other lubricants and is free of water. Lehigh Chemical Co.

▲ For details, circle 24 on Post Card

TEMPERATURE PROBE for the non-ridgid masses

Temperature readings at desired depths of non-rigid masses such as chemicals, plastics, rubber, etc. can be made with this retractable, through-surface probe

tip. The sensitive needle tip of probe is protected within a sheath when not in use. When temperature readings are desired, dial selector is turned, permitting insertion of tip into non-rigid masses to proper depth. Probes are designed for use with company's A+ Thermophil instruments covering —150 to 410 F on multiple scales. Atkins Technical, Inc.

▲ For details, circle 25 on Post Card

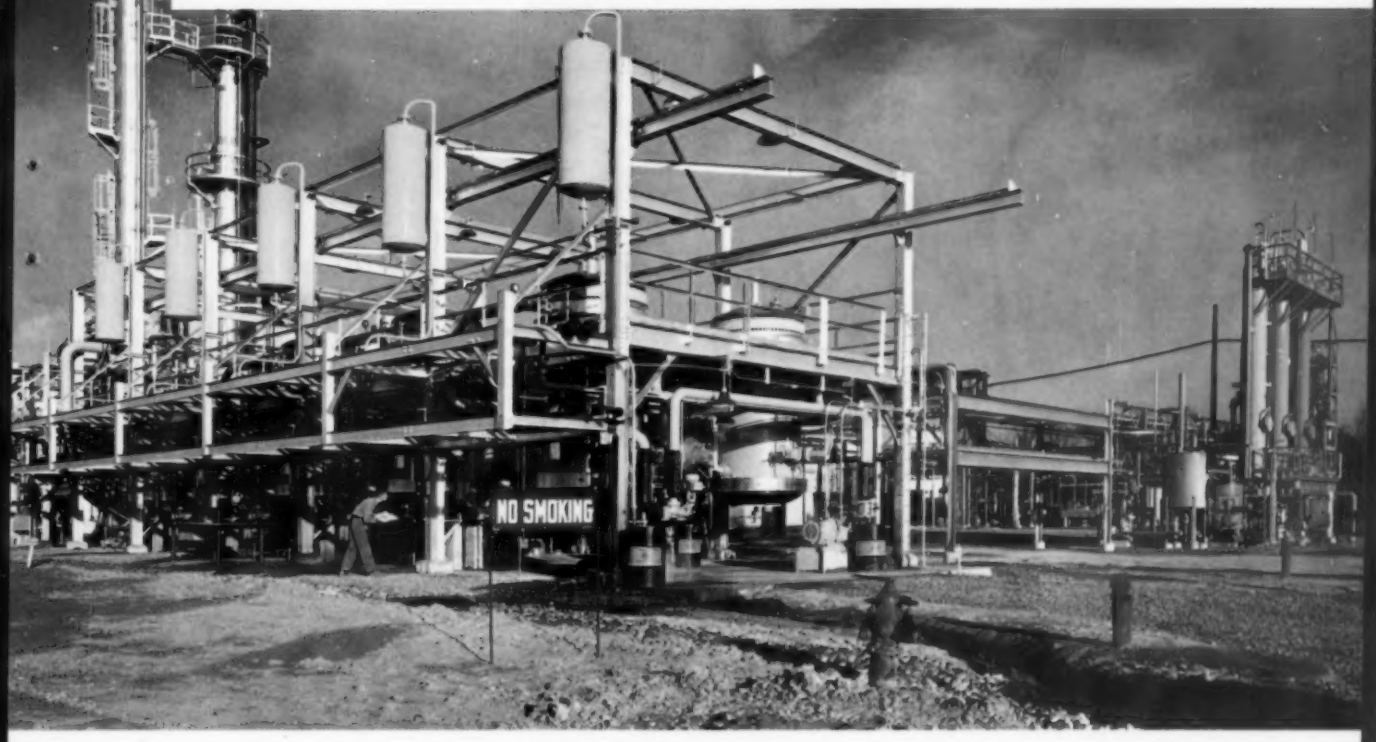
COMPOUND for patching, surfacing masonry floors

Glid-Crete is an epoxy resin compound said to provide greater hardness, tensile and flexural strength than concrete, as well as higher abrasion and impact resistance. It is also many times stronger, manufacturer states, and because of its resistance to harsh chemicals and detergents, to be particularly useful in areas where they are used. Described as possessing excellent adhesive and non-slip qualities, Glid-Crete is 100 per cent solids. A gallon covers an area of nearly 6½ sq ft at a ¼-in. film thickness. Under

For more facts circle 612 on Reply Card ⟶

CORROSION PROTECTION

In Depth . . . With Color!

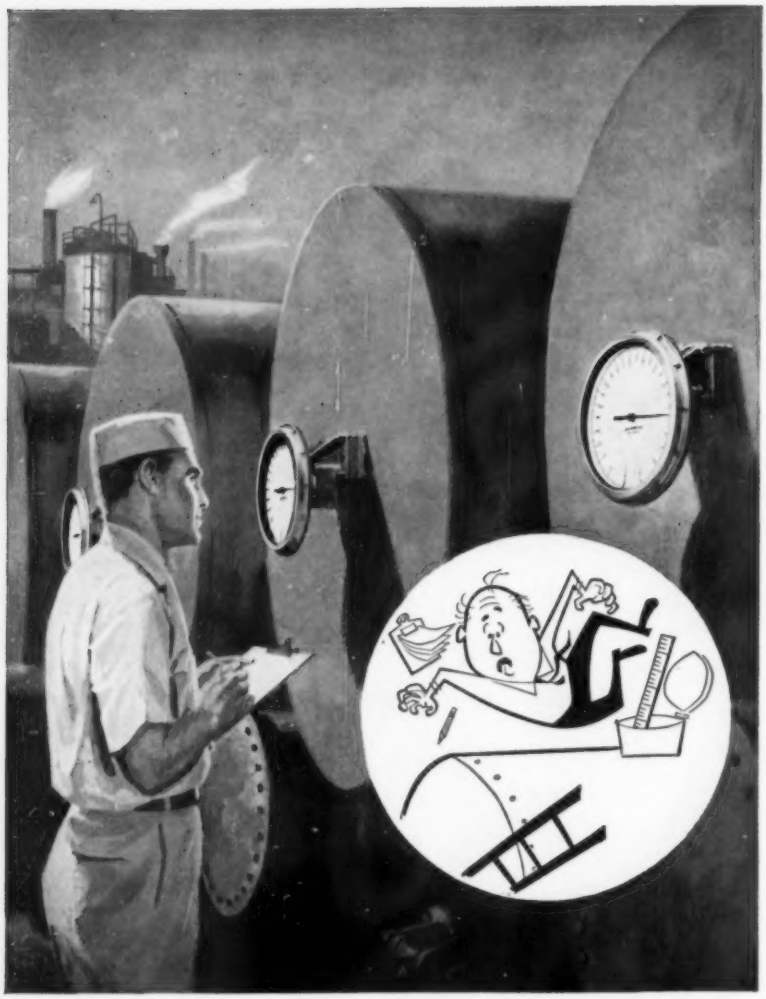


Wherever your plant and equipment are subject to critical acid, alkali or solvent exposures even at elevated temperatures, high humidity, severe weathering — or any combination of these — one of Truscon's corrosion control systems will provide maximum protection at lowest cost per square foot per year.

Truscon will also provide guidance in proper surface preparation, coating application, and inspection. For a detailed, written specification on protection of steel, iron, aluminum, concrete, and other surfaces, call the Truscon branch nearest you, or write Truscon Laboratories for specific information.

TRUSCON *Laboratories*

Industrial Maintenance Division of Devoe & Raynolds Co., Inc. • Detroit 11, Michigan



Reading liquid levels got you out on a limb?

Not if an easy-to-read Liquidometer Gauge is used to indicate exact levels at a glance. It's as simple as telling time... ends potentially dangerous dip-sticking.

Liquidometer Gauges enable one man to read liquid levels safely and precisely—keeping a continuous, right-at-hand inventory — without risking life and limb.

Take the hazards out of liquid measurement—save time, too—by installing reliable Liquidometer Gauges. There is a type available for practically every liquid measuring application.

For complete details, write

LIQUIDOMETER INSTRUMENTS

THE LIQUIDOMETER CORP.

Dept. B, LONG ISLAND CITY 1, NEW YORK

For more facts circle 613 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

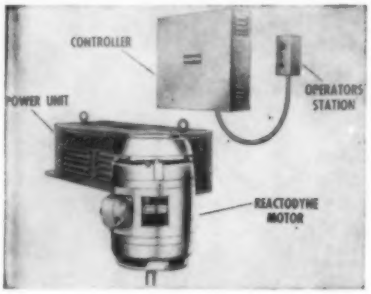
normal weather conditions, Glid-Crete is said to take traffic after an overnight air dry, with complete hardness achieved after a 2-wk curing period. The Glid-Crete system is offered in three parts: an epoxy resin base, a converter or accelerator, and sand, to be mixed at the job site. The finished compound can be trowelled on like concrete. The Glidden Co.

▲ For details, circle 26 on Post Card

Reader Service Post Cards for requesting more details on products described are provided on pages 291-292.

VARIABLE SPEED CONTROL
for pump and fan drive

Reactodyne, a controlled speed system for centrifugal pump and fan drives, furnishes variable speeds from all-electric induction motors. In most applications, the system will be used where it is desirable to automatically control pump and/or fan speeds, this being accomplished by means of a signal from a small potentiometer actuated by liquid level,



temperatures, pressure etc. The drive system is designed for use on "cubic" loads (heat exchanger fans and sewage pumps) where torque requirements fall off rapidly at lower speeds. Use is not intended on constant torque loads. The drive is designed to operate from a standard 220/400-v, 60-cycle a-c power supply. Drive motors are available in horizontal or vertical types in open design.

Manufacturer points out that no moving parts are contained in the design of this control. Operator's station can be set remotely from the drive. In an emergency where continuous operation is mandatory, the

Now . . . pull the fan wheel or motor while DeBothezat® Bifurcator® Fan remains in duct.

Not just an access door. Half the entire cone comes off.

Speed up inspection . . . slash maintenance and downtime costs.

This removable cone design is an exclusive feature found only on DeBothezat Bifurcator Fans.

Published ratings on DeBothezat Fans tell you exactly what the complete fan unit puts out. No guess work — no allowance to be on safe side!

New design duct fan

De Bothezat® FANS

DIVISION OF

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

THIS COUPON ANSWERED WITHIN 24 HOURS

DeBOTHEZAT FANS DIVISION, Dept. PE-960,
American Machine and Metals, Inc.
East Moline, Illinois

Gentlemen: Your new Removable Cone feature for DeBothezat Bifurcator Fans looks good to me. Please rush descriptive literature at once.

NAME

FIRM NAME

ADDRESS

CITY & ZONE STATE

Divisions of American Machine and Metals, Inc.

TROY LAUNDRY MACHINERY • RIEHLE TESTING MACHINES • DE BOTHEZAT FANS • TOLHURST CENTRIFUGALS • FILTRATION ENGINEERS • FILTRATION FABRICS
NIAGARA FILTERS • UNITED STATES GAUGE • RAHM INSTRUMENTS • LAMB ELECTRIC COMPANY • HUNTER SPRING COMPANY • GLASER STEERS CORPORATION

For more facts circle 614 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

control system may be by-passed and motor operated at maximum speed by connecting directly to plant a-c supply line. Ratings are from 1 to 30 hp with a 2:1 speed variation. U. S. Electrical Motors Inc.

▲ For details, circle 27 on Post Card

LIGHTING FIXTURE built for fast installation

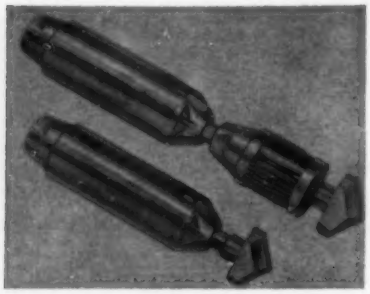
The 12-ft Super Speed-Line Fixture installs fast—manufacturer guarantees that total assembly time won't exceed 1½ man-hours per 24 ft of fixture from the time ceiling hickeys are in place. The unit has a 12-ft one-piece

chassis (4- and 8-ft fill-in units are available). With the 50 per cent length advantages of these fixtures, fewer couplings and wiring splices are required, it is pointed out; also fewer stem hangers are used and runs of any length may be assembled at work level, then raised to the ceiling as a single unit. Other features are 45-hv-45 deg shielding, one-piece hook-on shields, choice of solid or translucent sides. Garcy Lighting, Div., Garden City Plating & Mfg. Co.

▲ For details, circle 28 on Post Card

PREHEATER TUBE CLEANER designed to save time

Rotojet, a cleaner for boiler preheater tubes, consists of an air-or water-driven motor, sliding-pin expanding head, and carbide drill point. For some applications the expanding head can be fed through the length of each tube without stopping, company reports. This tool eliminates



multiple lengths of rigid sectional shafting and joining of additional sections as the drill advances in the tube. Elliott Co., Roto Plant.

▲ For details, circle 29 on Post Card

PROXIMITY TRANSDUCER reduces cost of automation

According to manufacturer, this equipment is the lowest priced proximity switch capable of sensing both non-ferrous and ferrous metal parts—complete installations, including sensing and control units, start around $85.00. Installations consist of a pickup (mounted at point of work), and a control unit. Any metal workpiece, ferrous or non-ferrous, activates the pickup without physical contact. The pickup is connected by cable to an associated control unit, which provides power to sensitize the pickup. A relay in the control operates whenever the pickup detects metal, and controls associated mechnical equipment or electrical circuitry.

The low cost system features company's standard proximity control

unit, Model 4902, which can be housed in any wiring enclosure 6-by-8-by-4 in. or larger. Any number of these controls may be mounted side by side in consoles. A sensitivity control permits adjustment to desired operating range. Model 4902 is capable of up to 600 operations per minute, it is stated, and will respond to any metal part remaining within range of pickup for 50 milliseconds. Bulletin EDPS-80 gives data. Electro Products Laboratories, Inc.

▲ For details, circle 30 on Post Card

MISFIRE DETECTOR helps assure good welding

This misfire detector is designed for resistance welding control equipment. Any misfire of control's ignitron contactors, which operate on alternate half-cycles to switch current into welding transformer primary, trips a

G-B SNAP*ON DISTRIBUTORS

LISTED IN YELLOW PAGES

(See ad on facing page)

AKRON, Ohio, The Asbestos Supply Co.
ALBANY, Ga., Industry Insulation Co.
ALBANY, N. Y., Hudson Valley Asbestos Corp.
ALBUQUERQUE, N. M., Mt. States Insulation Co.
AMARILLO, Tex., McDonald Engineering & Insulating Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
AUSTIN, Tex., Cinbar Engineering Co.
BALTIMORE, Md., Leroy Insulation Co.
BANGOR, Me., Eastern Glass Co.
BATON ROUGE, La., Eagle Asbestos & Packing Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Reynolds Aluminum Supply Co.
Shook & Fletcher Supply Co.
BOSTON, Mass., Homans-Kohler, Inc.
BRIDGEPORT, Conn., Robert A. Keasbey Co., Inc.
BUFFALO, N. Y., Industrial Insulation Sales, Inc.
BURLINGTON, Vt., Pipe Insulators, Inc.
CHAMPAIGN, Ill., The Lewie-David Co.
CHARLESTON, W. Va., Asbestos & Insulating Co.
CHARLOTTE, N. C., D & B Insulation Co.
CHICAGO, Ill., E. C. Carlson Co.
Culberg Asbestos & Cork Co.
CHILLICOTHE, Ohio, Southern Ohio Insulating Co.
CHRISTOPHER, Ill., Hoe Supply Co.
CINCINNATI, Ohio, R. E. Kramig Co.
CLEVELAND, Ohio, Ohio Asbestos & Insulation Co.
COLUMBIA, S. C., Industrial Insulation Div. of Richland Oil Co.
COLUMBUS, Ohio, Santeler Brothers
Culberg of Ohio
CORPUS CHRISTI, Tex., Precison Insulation Co.
DALLAS, Tex., Acme Insulation & Supply Co.
DAVENPORT, Iowa, Republic Electric Co.
DAYTONA BEACH, Fla., B & F Insulation Co.
DECATUR, Ill., The Lewie-David Co.
DENVER, Colo., Plateau Supply Co.
Powers Industrial Insulation, Inc.
DES MOINES, Iowa, Iowa Asbestos Company, Inc.
DETROIT, Mich., The Walter Rankin Co.
ERIE, Pa., Laco-McMullen Co.
EVANSVILLE, Ind., Geo. Koch Sons, Inc.
FALCONER, N. Y., Laco Roofing
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, Tex., Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Tex., Precison Insulation Co.
INDIANAPOLIS, Ind., Lyon Lumber & Supply Co.
JACKSON, Miss., Paine Refrigeration & Supply Co.
JACKSONVILLE, Fla., Eckles Distributors, Inc.
Reynolds Alum. Sup. Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Mo., Central Supply Co.
Kelley Asbestos Prod.
KEWANEE, Ill., Mechanical Insulation Co., Inc.
LITTLE ROCK, Ark., Gunn Distributing Co.
LOS ANGELES, Calif., Accurate Insulation Co., Inc.
Western Fibrous Glass Products Co.
LOUISVILLE, Ky., General Insulation & Roofing Co.
MACON, Ga., Industry Insulation Co.
MARIETTA, Ohio, Asbestos & Insulating Co.
MEMPHIS, Tenn., Gibbons Supply Co.
MIAMI, Fla., Reynolds Aluminum Supply Co.
Southern Metal Products Co.
MILWAUKEE, Wisc., F. R. Dengel Co.
MINNEAPOLIS, Minn., Asbestos Products, Inc.
MOORHEAD, Minn., Fargo-Moorhead Insulation Co.
NASHVILLE, Tenn., Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
Robert A. Keasbey Co., Inc.
NEW ORLEANS, La., Eagle Asbestos & Packing Co.
NEW YORK, N. Y., Eastern Steam Specialty Co.
Robert A. Keasbey Co., Inc.
OKLA. CITY, Okla., Ball Distributing & Engineering Co.
OMAHA, Nebr., Cardinal Supply & Mfg. Co.
ORANGE, Conn., Insulation Supply Co.
PADUCAH, Ky., Triangle Insulation Co.
PHILADELPHIA, Pa., John F. Scanlan, Inc.
PHOENIX, Ariz., Williams Insulation Co.
PITTSBURGH, Pa., Dravo Corp., Keystone Div.
PORTLAND, Me., Eastern Glass Co.
PORTLAND, Ore., Western Fibrous Glass Prod. Co.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROANOKE, Va., C. E. Thurston Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Utah, Bullough Asbestos Sup. Co.
SAN ANTONIO, Tex., San Antonio Machine & Supply Co.
SAN DIEGO, Calif., Western Fibrous Glass Products Co.
SAN FRANCISCO, Calif., Western Fibrous Glass Prod. Co.
SAVANNAH, Ga., Reynolds Aluminum Supply Co.
SEATTLE, Wash., Western Fibrous Glass Products Co.
SHREVEPORT, La., Frith Sales Co.
SOMERVILLE, Mass., Insulation Products, Inc.
ST. LOUIS, Mo., Refrigeration Supplies, Inc.
The Stovey Company, Inc.
ST. PAUL, Minn., Abestos Products, Inc.
SYRACUSE, N. Y., Burnett Process, Inc.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, D. C., Walter E. Campbell Co., Inc.
WEST PALM BEACH, Fla., Southern Metal Prod.
WICHITA, Kans., General Metals, Inc.

He's also cutting costs ... with G-B SNAP*ON® pipe insulation

When applying insulation around obstructions, try this "short-cut": simply use G-B SNAP*ON, the one-piece pipe insulation molded of fine glass fibers. In just a matter of seconds, G-B SNAP*ON can be "tailor-cut" to fit snugly, neatly around runouts, feeders, valves, fittings, etc. And unlike brittle, rigid-type insulation materials that crack and break, G-B SNAP*ON is highly resilient . . . less susceptible to damage during installation. You'll be amazed, too, at how fast you can insulate straight runs, because 3′ and 6′ sections of G-B SNAP*ON snap over pipe in one quick, simple motion.

Add to these advantages the permanence and superior thermal efficiency of G-B SNAP*ON, and you can readily understand why it is industry's No. 1 choice for heated or cold lines. It's available from local stocks . . . plain or with a variety of facings for hot or cold lines, indoors or out . . . in sizes from copper tubing to 36″ IPS.

FOR INFORMATION & PROMPT DELIVERY SEE YOUR G-B SNAP*ON DISTRIBUTOR (LISTED IN THE ADJOINING COLUMN)

For more facts circle 615 on Reply Card

GUSTIN-BACON *Manufacturing Co* GUSTIN gb BACON

232 W. 10th St., Kansas City, Mo.

Thermal and acoustical glass fiber insulations . . . molded glass-fiber pipe insulation
Couplings and fittings for plain and grooved end pipe

New DAY "RJ" Dust Filter

CONTROLS DUST SAVES DOLLARS

only 3 moving parts

Built under patents of The DAY Company and H. J. Hersey, Jr.

Because of its new, simplified design the DAY "RJ" dust filter will save you many dollars on initial investment, installation, operation and maintenance. Some of the important new construction features of this dust filter are: a new, quick-opening reverse-air, counter-flow valve for maintaining filter media porosity; a new, reverse-air pressure blower arrangement, and new, air tight, yet quickly opened inspection doors.

This patented DAY dust filter has only 3 moving parts but controls dust effectively, efficiently (99.99+%) and economically. It represents the latest refinement in a long-tested, plant-proven dust filter. Using felted filter sleeves to capture dust, the "RJ" is now available in 5 sizes for handling from 300 to 6400 CFM of air (for larger capacities, multiple groupings are furnished).

For more detailed information write toDAY for free Bulletin G-30. It's filled with facts, specifications and dimensions.

The DAY Company

SOLD in UNITED STATES by
The DAY SALES Company
807 Third Avenue N.E.
Minneapolis 13, Minnesota
FEderal 6-9671

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
Rexdale (Toronto), Ontario, Canada
Fort William, Ontario, Canada
Rexdale, Cherry 1-8589

Representatives in Principal Cities

EXPERIENCE ENGINEERED . . . LABORATORY TESTED . . . PLANT PROVEN
Dust Control • Pneumatic Conveying • Bulk Storage
EQUIPMENT . . . SYSTEMS . . . INSTALLATION

For more facts circle 616 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

relay and gives an indication to operator. Should one tube fail to fire the welder skips, and second tube fires twice in succession, it is noted; this may saturate transformer and raise exciting current to a high value that could damage other ignitron. The detector gives instant indication of improper welds, useful in automatic seam-welding of materials with a narrow plastic temperature range. It helps prevent overloading an ignitron and indicates when tubes need replacement. General Electric Co.

▲ For details, circle 31 on Post Card

AUTOMATIC REEL holds air hose, clean-up hose

Model A-3 Reel King holds 25 ft of ⅜- or ¼-in. single hose. It is made of steel and aluminum, with brass shaft and connections; finish is baked enamel. This spring-operated reel drum locks for 170 deg of each turn,

is reversed by a relaxing pull on the hose. Open construction facilitates maintenance, and the clock-type spring and ball bearings are factory lubricated. The temperature range is—120 to 500 F, and maximum operating pressure is usually limited only by the hose. Several types of connections are available. The reel is suggested for suspended air guns, and tools, water clean-up hoses, paint booths, and air hose for moving machinery. United Specialties, Inc.

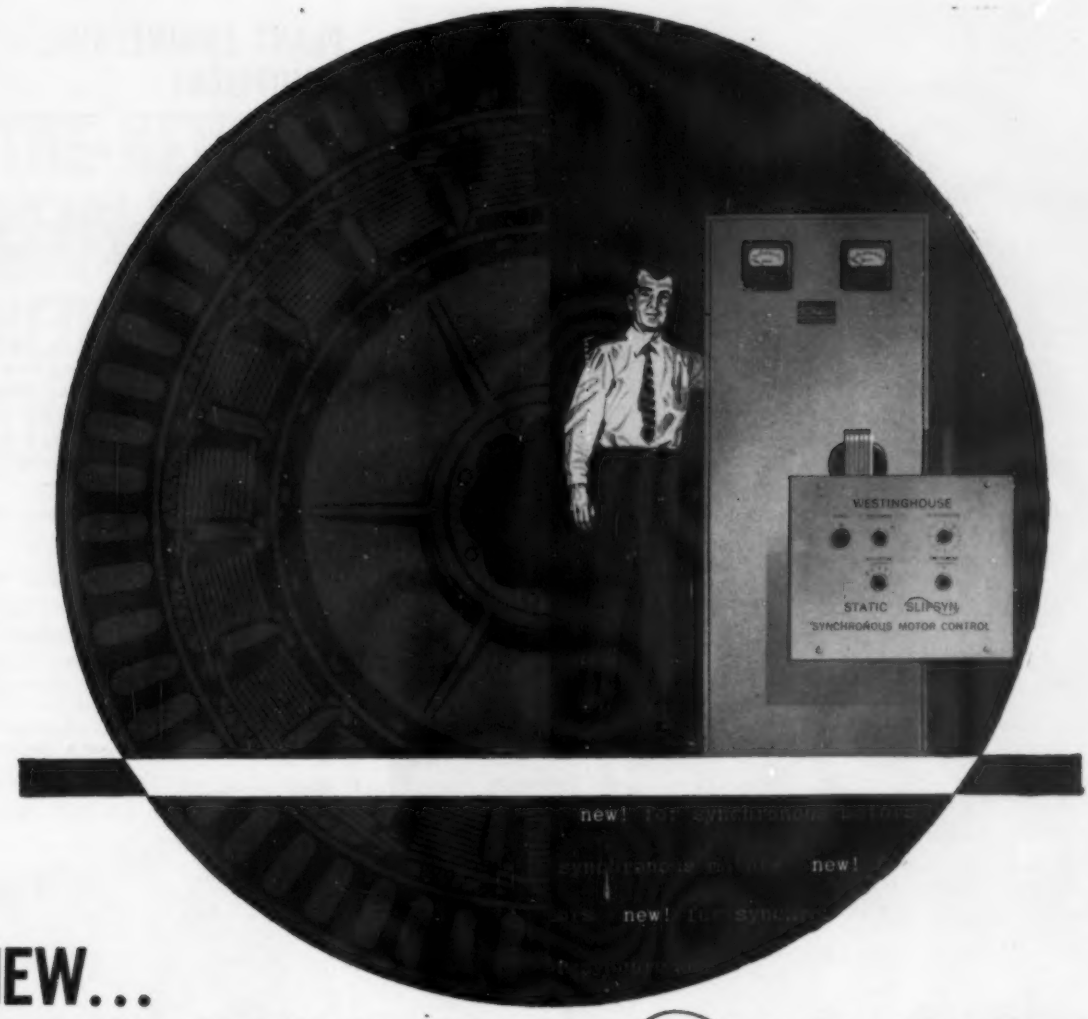
▲ For details, circle 32 on Post Card

DESCALER cleans, dissolves scale; is non-corroding

Scale-Cleen, a sulfamic acid descaler with inhibitors, is announced for cleaning and dissolving scale without corroding or damaging metal. A built-in color indicator shows when the

Thermal and acoustical glass fiber insulations . . . molded glass-fiber pipe insulation
Couplings and fittings for plain and grooved end pipe

For more facts circle 615 on Reply Card



NEW... WESTINGHOUSE STATIC SLIPSYN CONTROL

UPS RELIABILITY, VIRTUALLY ELIMINATES MAINTENANCE

STOP PUZZLING over synchronous motor controls . . . here's the advanced way to gain top performance. The all-new Westinghouse Static Slipsyn® control pays its own way by chopping motor control maintenance costs, practically eliminating down time and increasing reliability. Check these advantages:

WESTINGHOUSE STATIC SYNCHRONIZING CONTROL has no moving parts. It uses simple, reliable, transistorized networks instead of conventional relays . . . no contacts, bearings and springs to corrode, wear and fail. Size and weight are greatly reduced—and Static Slipsyn control is immune to contaminated, dusty surroundings.

WESTINGHOUSE STATIC SYNCHRONIZING CONTROL precisely applies motor field excitation at proper speed and pole position up to and including 99% of synchronous speed. Pull-out protection is positive and adjustable to avoid false tripping.

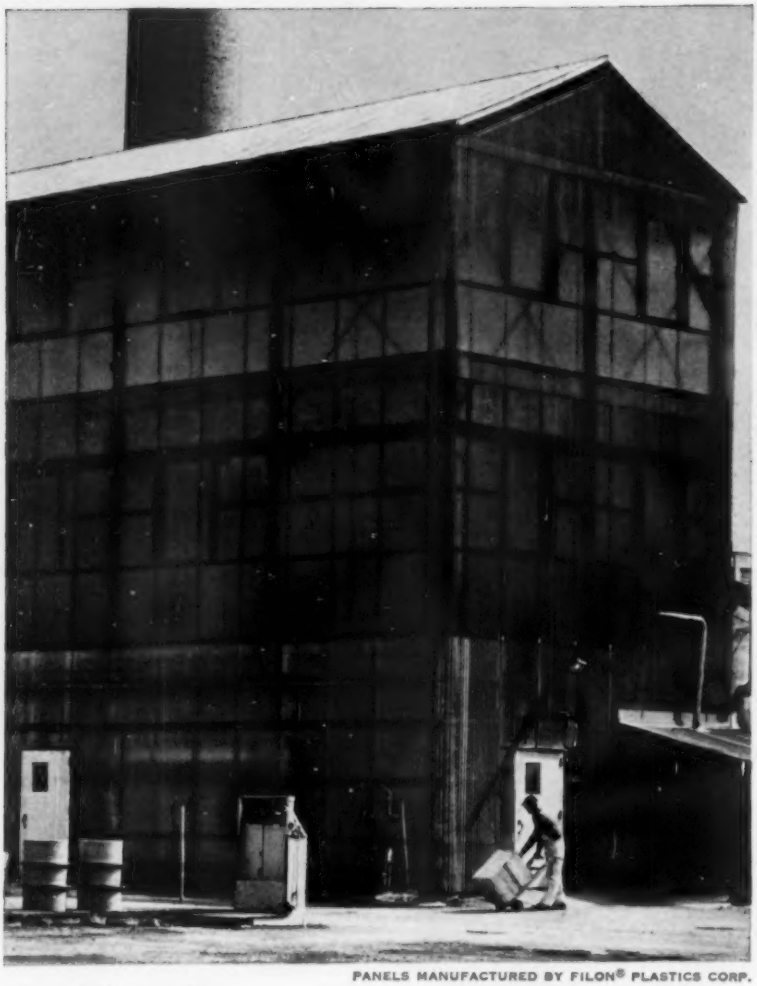
FOR NEW AND OLD INSTALLATIONS. Your Westinghouse salesman will help you apply the completely packaged Static Slipsyn control to synchronous motor installations now being planned. And he can show you how static synchronizing control units can replace the conventional, mechanical relays in your present control enclosures. Either way, Westinghouse Static Slipsyn control saves big money through reduced maintenance, improved reliability, shorter down times.

Contact your local representative or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-25001

YOU CAN BE SURE...IF IT'S

Westinghouse

For more facts circle 617 on Reply Card



PANELS MANUFACTURED BY FILON® PLASTICS CORP.

Acid-safe fire-safe translucent Hetron® panels enclose Kodak building

Those three points about fire-retardant Hetron panels made them a logical choice for Eastman Kodak Company's acid-still building when old siding had to be replaced.

Rigid, strong, meeting all building codes, these translucent fibrous-glass-reinforced panels never need painting. They reduce lighting loads, too.

How about *your* buildings? Do they need repair? Are you planning new ones?

Hetron-based panels have found a place in many industrial and commercial buildings. Shatterproof skylights on Brooklyn's huge Furman Street Pier. Geodesic dome structures on the DEW Line. False ceilings. Room dividers and many other uses. They come in a good many colors, too, for striking architectural effects.

If you would like more information on these fire-retardant panels, we suggest you write to Filon® Plastics Corporation, 333 North Van Ness Avenue, Hawthorne, California.

DUREZ PLASTICS DIVISION

3909 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICAL CORPORATION

HOOKER CHEMICALS PLASTICS

For more facts circle 618 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

acid has been spent. Scale-Cleen (95 per cent acid) is suggested for acid cleaning of boilers, air conditioners, heaters, evaporators, heat exchangers, steam generators, diesel cooling systems, etc. It is described as a dry crystalline material (a spill is simply shoveled up), without irritating fumes, and non-irritating to the skin. When dissolved in water, the descaler becomes a strong mineral acid, which incorporates an agent to speed its action. Dearborn Chemical Co.

For details, circle 33 on Post Card

FLARING TOOLS produce 45- and 37-deg flares

Three flaring tools are announced as producing uniform 45- and 37-deg flares quickly on copper, aluminum and brass tubing. In these tools, all working parts are locked together so

that they cannot become separated and lost, company states; and hinges and aligning pins lock yoke, die bars and tubing into alignment. Bottom of yoke automatically gages flares for length, and eccentrically mounted steel flaring cone forms flares by rolling action. Flare wall thickness is controlled by an automatic feed release. Flare is burnished when feed screw is released. The Ridge Tool Co.

For details, circle 34 on Post Card

EPOXY PIPE COATING has fast curing rate

Dearclad 765 is an epoxy pipe coating with rapid curing rate, exceptional resistance to physical impact, abrasion and moisture adsorption, manufacturer states; it protects against chemical attack, has high electrical resistance, and retains its physical properties

THE NEW, TIGHT-CLOSING PRESSURE REDUCING VALVE THAT *CAN'T FOUL*

If you like a simple, straight-forward solution to vexing valve problems, you're bound to be impressed with the new line of Leslie-Topper Pressure Reducing Valves. To avoid valve fouling, Leslie Engineers developed a tight-closing valve with an internal pilot that's completely out of the path of steam—*it just can't foul.* Let imaginative engineering simplify valve design and you get results.

Here's the one pressure reducing valve that handles poor steam conditions, intermittent or standby service better than any other valve. It provides high accuracy of regulation with negligible dead-end build up and costs only pennies for maintenance.

New, patented Leslie-Spiroflex* all metal diaphragm insures years of outstanding valve performance. It makes a long valve stroke possible in a packless design—there's nothing to leak, nothing to bind. It's time for a change when you can get rid of the cost and bother of fussy, old-fashioned pressure regulators.

*Trademark of Leslie Co.

Leslie-Topper Selection Table

Size	Inlet Pressure PSI	Adjustable Pressure Range PSI	CLASS		
			Cast Iron Construction	Bronze Body Construction With Iron Superstructure Castings*	All Bronze Construction
½" TO 1¼"	UP TO 150	2-10	GKLL	GLL	GBLL
	OVER 125	2-10	GKL	GL	GBL
	UP TO MAXIMUM BODY RATING	5-20	GKM	GM	GBM
		15-35	GKH	GH	GBH
1½" TO 2"		2-10	GKL	GL	GBL
		5-20	GKM	GM	GBM
	UP TO 150	5-35	GKHL	GHL	GBHL

*All parts in contact with controlled fluid are of bronze.

For sizing and capacity data write for Bulletin 582 or contact your Leslie Engineer—he's listed in the Yellow Pages under 'Valves' or 'Regulators'.

Leslie Co., 707B Grant Ave., Lyndhurst, New Jersey

For more facts circle 619 on Reply Card

This new Leslie-Topper Pressure Reducing valve is a part of Leslie's expanding line of control valves, regulators and pilots for steam, air and liquids.

TRADE LESLIE MARK

REGULATORS and CONTROLLERS

BULL OF THE WOODS
by J.R. WILLIAMS
STOP IT, YOU LUNKHEADS! THIS NEW KOLLMANN CAN OPEN THAT DRAIN LINE IN FIVE MINUTES WITHOUT DIGGING!
WATCH THIS! THE BULL TOLD MAINTENANCE NEXT TIME THAT DRAIN PLUGGED HE'D FIX IT FOR GOOD--SO MAINTENANCE BOUGHT A KOLLMANN 500 ON THE QUIET AND WAITED TO SPRING IT ON HIM!
QUESTION NOW IS WILL THE BULL HATE MAINTENANCE FOR LETTIN' HIM GET INTO A TWO-DAY MESS... OR WILL HE BE SO HAPPY TO STOP LOSIN' DOWN-TIME FROM PLUGGED DRAINS HE'LL VOTE 'EM ALL A RAISE!
THE LATE "SPRING"

it's faster— with a KOLLMANN!

● Whether it's congealed oil and chips in a shop drain, grease in a hand basin, "caking" in a supply line or roots and rags in a sewer... *when a flow line plugs, there's trouble and "down" time in the plant.*

That's when the Kollmann 500 is literally "worth its weight in man hours." Fast, rugged and easily operated by one man, this dolly-mounted unit can get to the trouble and clear the most stubborn stoppage often faster than you could make a phone call.

●

Especially designed for industrial use, the 500 handles up to 200′ of sectional cables through traps and bends on lines from 3″ to 10″. Quickly adapts to lines as small as 1¼″. Explosion-proof, air and gasoline power available. Quickly pays for itself in saving "down" time.

Many of the "big names" of American industry save money and nuisance with Kollmann equipment. Write for details.

KOLLMANN
MANUFACTURING CO., Inc.
ERIE, PENNSYLVANIA • Phone: UNion 4-3851
LEADERS IN POWER DRAIN CLEANING EQUIPMENT SINCE 1936

For more facts circle 620 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

from -40 to 250 F. Composed of two components for blending at the point of application, Dearclad 765 can be applied with brush, roller, or airless-type spray equipment.

When properly cured, the coating is said to withstand rough handling without damage. Pipe coated with it can be stored above ground in the sun or under heavy pressure of piled pipe, it is noted. Underground, this coating serves to prevent damage due to soil stress and the dead load pressure of rocky trench backfill. Company recommends it for mill or yard coating because of its ease of application, short curing time and sag resistance. Dearborn Chemical Co.

▲ For details, circle 35 on Post Card

Readers Service Cards on pages 291-292 make it easy to get further information on any of this equipment. Just circle the item numbers of the products you would like to know more about.

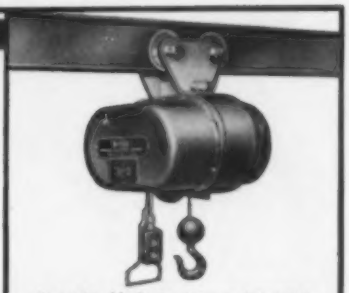
FLOW CLASSIFIER for in-line installation

Gas/liquid flow classifiers in the Series PMABB are designed for vertical in-line installation in any process piping. They permit passage of liquids while preventing passage of gases, making them suitable for use in any processing system where transfer of fluids under

pressure is involved. The unit is so arranged that the flow classifier valving remains open for full flow, with negligible pressure drop as long as there is fluid in the line, manufacturer explains; yet the valve is automatically closed and held closed under a pres-

Meet the "heavy" of all standard heavy duty hoists... priced right... immediate delivery!

The AE Class BB-3, 3-ton standard heavy duty hoist with plain trolley



The AE L-¼, ¼-ton heavy duty hoist.

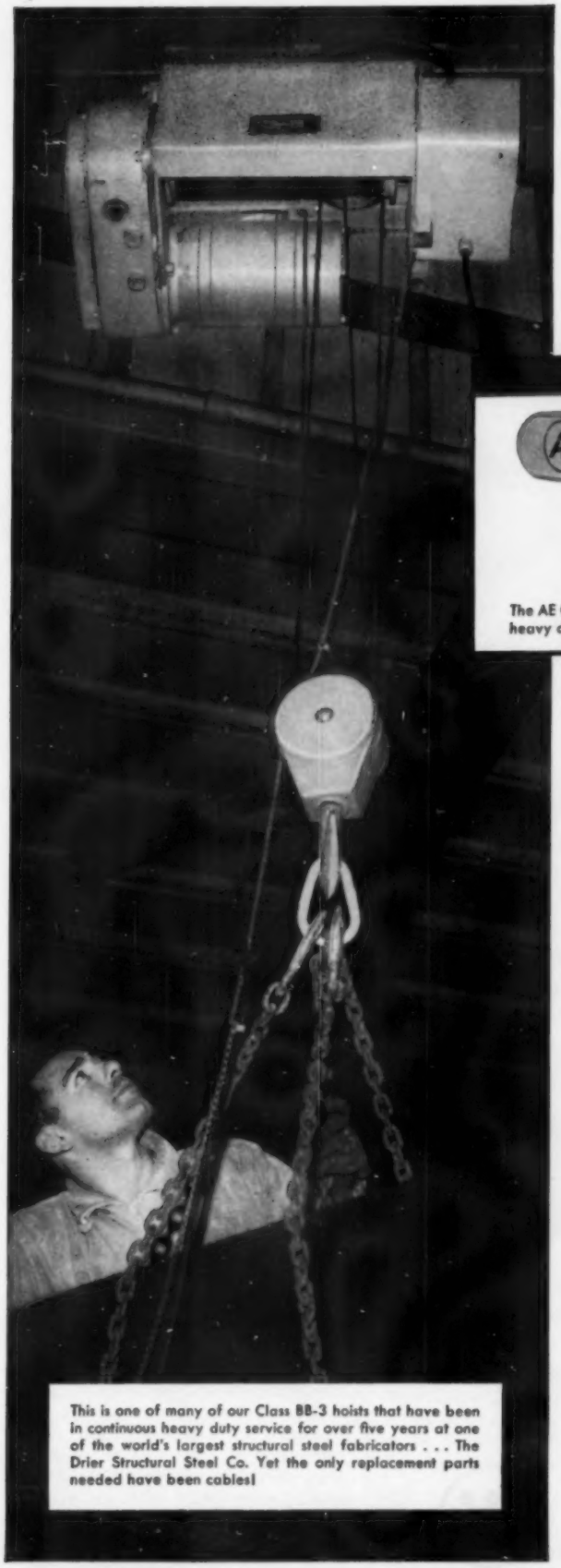
When other heavy duty hoists can't stand the gaff, here's one that will. It's our Class BB-3. Ask any user . . . look at the price, it's low . . . then compare it point by point.

- Welded steel chassis.
- Hardened alloy steel, spur gear drive.
- Double brakes.
- Heavy duty, crane type motor with high starting torque.
- Single-speed, pushbutton control with 120-volt pilot circuit.
- Huskiest, most modern block available.
- Available in all suspensions . . . lug, plain, hand-geared and motor-driven trolleys.

The BB-3 is a standard 3-ton hoist that will stand up on the toughest jobs . . . in the critical spots where production flow must be maintained . . . regardless. It's priced to sell . . . less than many competitive hoists . . . and delivery is immediate from stock!

If you're looking at hoists, don't overlook our L-¼. It is the only truly heavy duty, ¼-ton hoist on the market. Compare its husky 195 lb to the usual 60- to 80-lb hoist, and be convinced! It costs a little more, but it's worth more. It will pay for itself many times over in maintenance savings alone.

For complete information and specifications refer to Sweet's Plant Engineering File 1a/Ae, or write for our new catalog H-59.
AMERICAN ENGINEERING COMPANY,
Dept. H-164, Philadelphia 37, Pa.

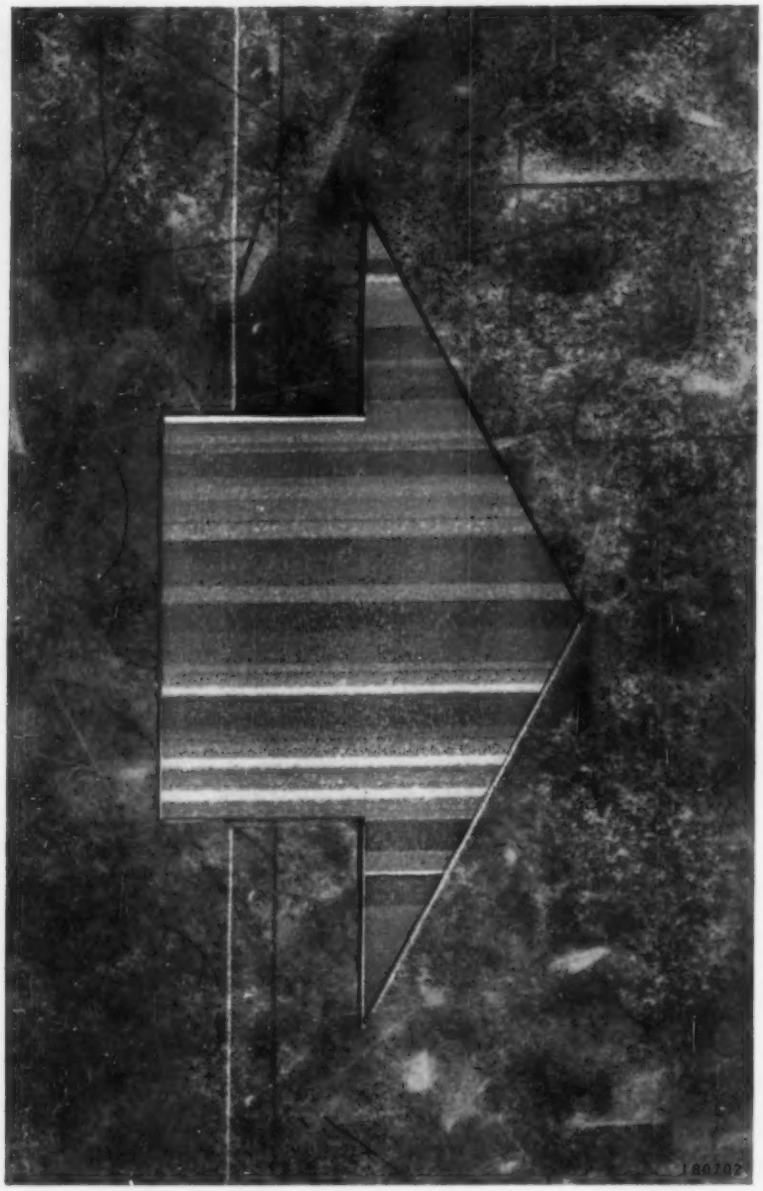


This is one of many of our Class BB-3 hoists that have been in continuous heavy duty service for over five years at one of the world's largest structural steel fabricators . . . The Drier Structural Steel Co. Yet the only replacement parts needed have been cables!

AMERICAN ENGINEERING COMPANY
Division of United Industrial Corporation

For more facts circle 621 on Reply Card

A new development in air dynamics!



A NEW FAN. Today's airfoil centrifugal fan performance in a new space-saving shape. Uses less than half the installed space of conventional centrifugal fans. Interested? Watch for an October announcement.

Our new space-saving centrifugal fan and catalog will be available in October. Why not write now and reserve a copy of the catalog? You can be sure if it's Westinghouse. Sturtevant Division, Hyde Park 36, Massachusetts.

Westinghouse

For more facts circle 622 on Reply Card

PLANT ENGINEERING EQUIPMENT

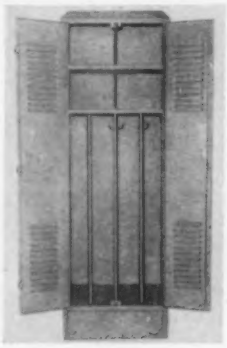
(Begins on page 206)

sure seal as soon as the line is emptied of fluid. This serves to prevent inadvertent pressure blow-back of air or gas through the process fluid, a feature which enables use of air or gas pressure for transfer of acids or volatile gases, it is noted. The classifiers come in three sizes to fit nominal pipe diameters of 2, 3 and 4 in. Prenco Mfg. Co.

For details, circle 36 on Post Card

STEEL WARDROBE LOCKER
serves 4 or 6 persons

Design features announced for these double-door steel lockers are: internal lift door handle; continuous strike door frame; full-loop door hinges; and optional Auto-Lock. The door handle is fixed and does not move

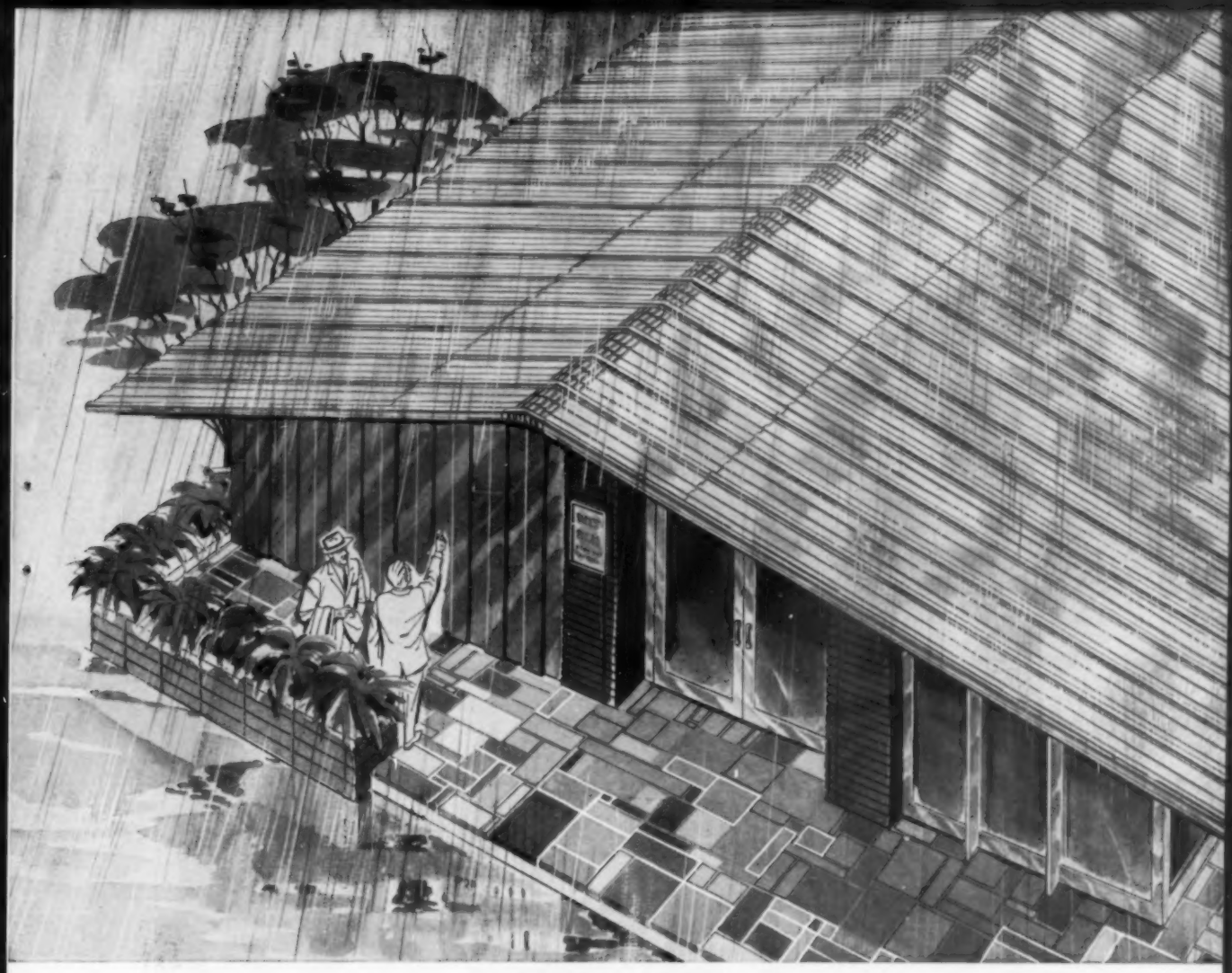


when the latch is operated, company points out, and this eliminates need for handle replacement due to rough usage. The optional Auto-Lock eliminates the conventional door handle by permitting doors to be opened and closed with a heavy-duty key. The lockers are equipped with hat shelves and coat hooks. They are 66 in. high (including 6-in. base), 22 in. wide and 15 in. deep. Louvers provide ventilation. Colors are gray, green, tan. Penco Div., Alan Wood Steel Co.

For details, circle 37 on Post Card

MANHOLE FITTINGS are above-ground type

For above-ground installation, Type EAM Manhole Condulets are announced as explosion-proof, dust-ignition-proof and weather resistant. They provide a convenient means for splicing main feeder cable and making branch taps and are intended to replace conventional below-ground units. They afford easy inspection of con-



A GUARANTEED ROOF OVER YOUR HEAD

New...and only with Butler... full 20-year roof protection for pre-engineered buildings

Here's another reason to "go Butler" for your new building this year. You can have a preferred aluminum roof so superior that we are now able to offer a *20-year guarantee.*

This is the first long-term roof guarantee ever offered for pre-engineered buildings. It is made possible by Butler's leadership in designing and fabricating an enduring, weatherproof aluminum roof system that today has an impressive history of outstanding job performance on thousands of Butler buildings. Be sure that this new development in roof security, optional at nominal extra cost, is considered in your new building plans.

Your Lowest-Cost Way to Build Well—superior roof protection is one of many reasons why more offices, plants, stores, warehouses, terminals, recreation centers, schools and churches every year are being built with the Butler Building System.

For your new building, take advantage of the wide, clear spans of Butler rigid frames . . . the beautiful new Butler-Tone™ baked-on color finishes for wall and roof panels . . . your choice of the finest factory-insulated or field-insulated exterior wall panels . . . the fast, trouble-free construction . . . and the dependable, talented services of the nationwide group of Butler Builders.

Interested? See your Yellow Pages for the name of your Butler Builder, under "Buildings" or "Steel Buildings." Ask about financing, too . . . or write direct.

"See Sweet's Industrial Construction File – Section 6-B"

MBMA

BUTLER

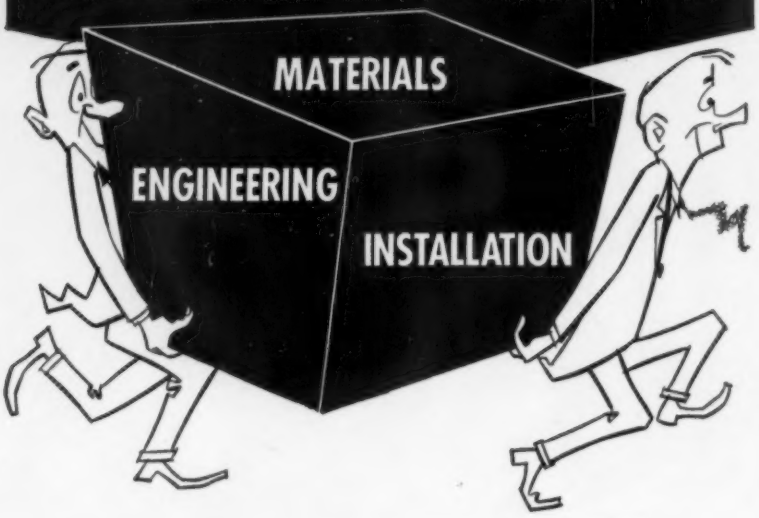
BUTLER MANUFACTURING COMPANY 7529 East 13th Street, Kansas City 26, Missouri

Manufacturers of Metal Buildings • Equipment for Farming, Oil Transportation, Outdoor Advertising • Contract Manufacturing

Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. Detroit, Mich. • Cleveland, Ohio • Pittsburgh, Pa. • New York City and Syracuse, N.Y. • Boston, Mass. • Washington, D.C. • Burlington, Ont., Can.

For more facts circle 623 on Reply Card

CEILCOTE OFFERS THE ONLY COMPLETE PACKAGE CORROSION-PROOFING SERVICE



✓ ONE SOURCE
✓ ONE CONTRACT

MONOLITHIC FLOORING
PROTECTIVE LININGS AND COATINGS
BONDING CEMENTS
GROUTING MATERIALS AND ADHESIVES
PLASTIC VENTILATING EQUIPMENT
PLASTIC PROCESS EQUIPMENT
INSTALLATION SERVICES

Now you can consolidate contracts . . . concentrate responsibility for corrosion-proofing service . . . save time and money! Ceilcote's "Complete Package" gives you the benefit of Ceilcote's extensive facilities plus 33 years of experience in developing, producing and installing corrosion resistant facilities. Working under contract, experienced Ceilcote engineers and competent installation crews handle all your problems and *guarantee job satisfaction!* Typical successful installations include flooring, tank linings, foundations, pits, piers, waste disposal systems as well as all types of Duracor reinforced plastic process equipment and ventilations systems. Write for complete information or call your nearest Ceilcote Sales Representative.

ALABAMA: BIRMINGHAM LY. 2-7201. CALIFORNIA: OAKLAND TE. 2-0103, SANTA ANA P.O. BOX 625. COLORADO: DENVER GL. 5-3651, WASHINGTON, D.C. OL. 6-4321. FLORIDA: CORAL GABLES MO. 5-1965. ILLINOIS: CHICAGO AN. 3-1881. INDIANA: EVANSVILLE HA. 3-3597. MASSACHUSETTS: SPRINGFIELD RE. 6-5203. MICHIGAN: DETROIT LA. 6-4800. MISSOURI: KANSAS CITY MI. 9-1312. NEW JERSEY: PRINCETON WA. 1-6969. NEW YORK: NEW YORK CO. 7-0276, ROCHESTER GR. 3-5918. OHIO: CINCINNATI EL. 1-5765, CLEVELAND ER. 1-4558. PENNSYLVANIA: PHILADELPHIA KI. 5-0720, PITTSBURGH AT. 1-8500. TENNESSEE: KNOXVILLE 2-5770. TEXAS: HOUSTON JA. 2-1606. WASHINGTON: SEATTLE SU. 3-9200.
CANADA: OTTAWA CE. 3-7785.

CEILCOTE

THE CEILCOTE COMPANY INC.

4915 Ridge Road, Cleveland 9, Ohio

For more facts circle 624 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

nections at any time, as the covers are readily removable. Also, the interiors do not have to be filled with hot insulating and water-proofing compound, company notes. Type EAM, listed with and without terminal block, is suitable for up to 600 v. It has two 4-in. conduit openings in the bottom, can be furnished with up to four 1¼-in. branch openings. Crouse-Hinds Co.

▲ For details, circle 38 on Post Card

VERTICAL CHECK VALVES with design improvements

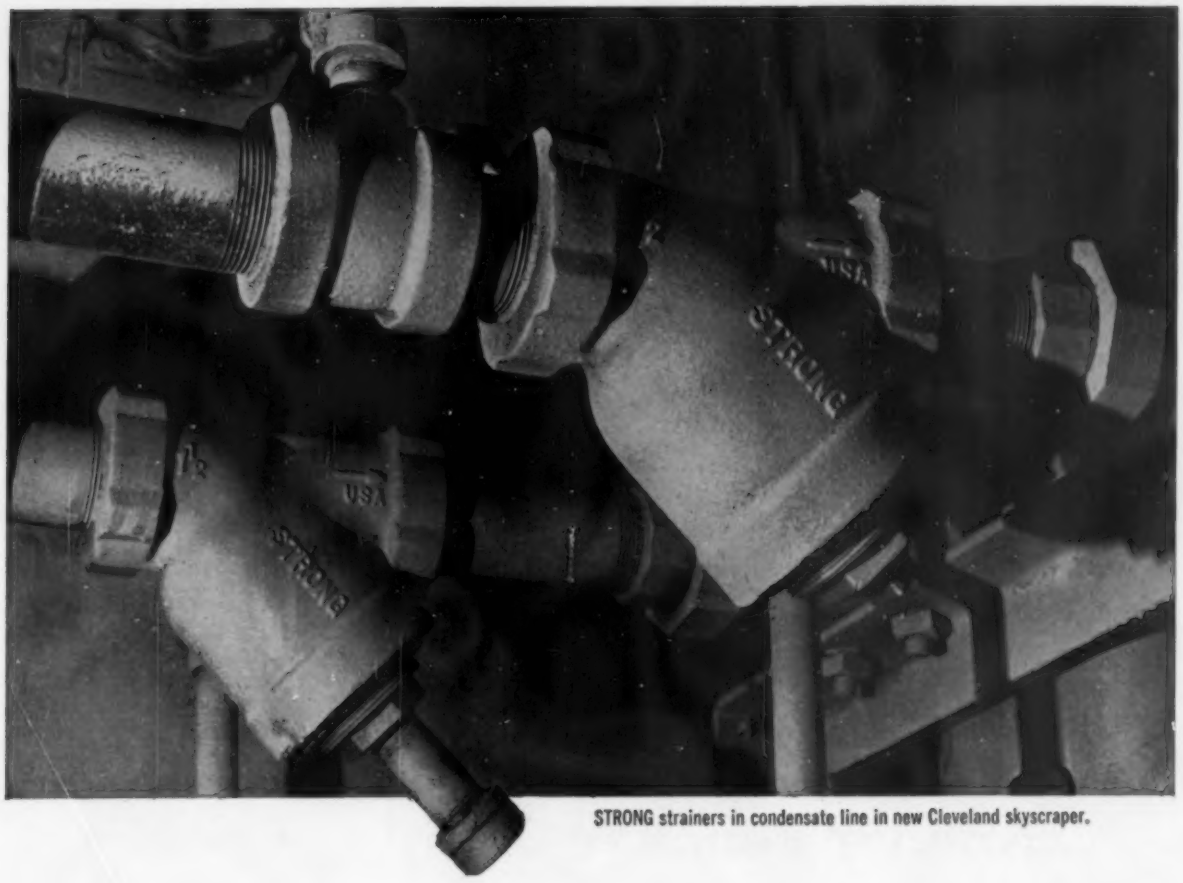
No. 29 Valves are 125-lb bronze vertical check valves replacing company's No. 24 series and incorporating major design changes. These include

one-piece body construction; use of hexagon ends for greater structural strength and better wrench grip; smaller reduced parts for greater disc lift under varying flow conditions; and a new type of guided disc for more accurate seating in the smaller sizes. Sizes range from ¼ to 3 in. Crane Co.

▲ For details, circle 39 on Post Card

DENSIFIER, RETARDER improves concrete mixes

Symentard is a blend of chemically active compounds in powder form to control, set and reduce water content without increasing air content in concrete and mortar mixes, acting as a retarding densifier to produce mixes of high quality and uniformity. Symentard is formulated to reduce water requirements and retard setting, so that as temperature rises and water requirements increase, the proportion of Symentard can be increased, resulting in greater water reduction to keep water cement ratio uniform. Symentard does not entrain air, it is ex-



STRONG strainers in condensate line in new Cleveland skyscraper.

select the STRONG® strainer *designed for you!*

IN steam, air, gas, water, oil or chemical systems, a *correctly selected* strainer pays for itself many times. It protects expensive equipment (traps, control instruments, meters, etc.) and reduces over-all maintenance and service costs.

Assure your system maximum protection from dirt, scale, sludge and sediment . . . specify *the* STRONG strainer designed for your requirements.

Sizes: from ¼" to 8"

Service: 250 psi at 450° F to 2500 psi at 1100° F

Screens: stainless screens with .027", .045", .062", or .125" perforations (at no extra cost)

Types: "Y" or Angle with screwed or socket-weld (flanged) connections

Materials: semi-steel, ductile-iron, bronze, Monel, cast or block steel, or new all-stainless or Hasteloy

STRONG'S extensive line of rugged, high-quality strainers are available from your local STRONG distributor. Contact him for assistance in selecting the *right* strainer, or write for your copy of STRONG Bulletin SS—21C.

STRONG, CARLISLE & HAMMOND

508 Sandusky Street, Conneaut, Ohio

air traps • strainers • reducing valves • vacuum or pumping traps
continuous blowdown valves • separators • engine stops • F and T traps • safety headgear

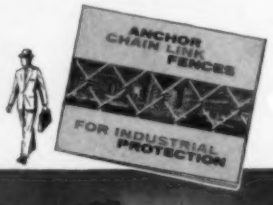
For more facts circle 625 on Reply Card

John Burrows, Plant Mgr., Ralston Purina, Davenport, Iowa, says:

"...Anchor Fence really solved our problems."

"Our plant area used to be what the legal profession calls an 'attractive nuisance.' Children and dogs had access to the grounds. And we had pilferage and traffic tangles to cope with too. The installation of Anchor Fence really solved our problems. Traffic now flows more smoothly, employee cars are protected, and of course the safety of children is no longer a headache. The Anchor men made numerous trips to the plant to be sure the job was tailor-made to our needs."

Call your local Anchor office today for a talk with one of Anchor's trained sales engineers. Write for free catalogue to: ANCHOR FENCE, 6661 Eastern Ave., Baltimore 24, Maryland.



ANCHOR FENCE
Division of ANCHOR POST PRODUCTS, INC.

Plants in Baltimore, Md.; Houston, Texas; and Whittier, Cal. • Sold direct from factory branches in principal cities.

For more facts circle 626 on Reply Card

PLANT ENGINEERING EQUIPMENT

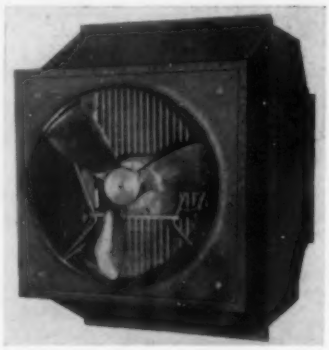
(Begins on page 206)

plained; whether the original concrete is air entrained or not, the proportions of Symentard may be varied without concern about air content—and since it acts only on the cement gel, it is effective with all type of cement and aggregates. It also accelerates the rate of bleeding from the usual 15 to 20 per cent of total bleeding in the first hour in most plain concrete, to 75 to 80 per cent, reducing "honeycombing." A. C. Horn Companies, Div., Sun Chemical Corp.

▲ For details, circle 40 on Post Card

INTAKE UNITS replace air removed by exhaust systems

These steam-fired air intake units consist of a single cabinet housing a propeller fan and a steam coil. Four standard units provide a capacity range from 4000 to 36,000 cfm. Units can be installed with or without filters



and distribution ducts, according to requirements of installation. Shutters, filter house, filters, and outlet diffusers are available accessories. If tempered air is not required, heating coil can be omitted. Belt-drive duct fans, and vaneaxial and centrifugal blowers for external mounting can be supplied on order for use in high static applications or where other factors make internally-mounted, direct-connected fans impractical to use. Hartzell Propeller Fan Co.

▲ For details, circle 41 on Post Card

IGNITER CONTROL fires a network of gas burners

The Ignitifier is a multi-burner igniter control for automatically firing up a network of gas burners in ovens, furnaces, boilers, etc. Features include high-speed ignition (up to 32 burners

add this new twist to your profit picture

NO FLARING
NO THREADING
NO SOLDERING
NO WELDING

assembled anywhere--
with just a wrench
and lubricant

WEATHERHEAD ERMETO STEEL FITTINGS

ERMETO Ease of Assembly Saved These Companies TIME and MONEY

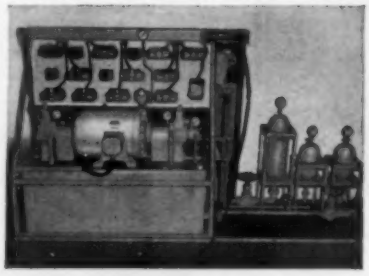
Weatherhead Ermeto flareless hydraulic fittings—easily assembled by inexperienced personnel without elaborate tools—are enabling many companies to achieve important installation savings in both time and money. In service, the excellent leak-proof, anti-vibration characteristics of Ermeto fittings keep maintenance and down-time at a minimum. Ermeto fittings are available in stainless or carbon steel with "Weathercote" or cadmium finish. All shapes in sizes: ⅛ to 2", for pressures up to 10,000 psi.

SAVED: $5,000

COMPANY: Good Roads Machinery Corporation Minerva, Ohio.

APPLICATION: Carbon Steel Ermeto fittings on hydraulically-actuated snow plows on industrial tractors. Operated with hydraulic oil at 100° F and 400 psi.

RESULTS: Ermeto fittings saved the company $5,000 because of their ease of assembly and because experienced help was not necessary.



SAVED: 60 HOURS

COMPANY: Portland Industries South Portland, Maine

APPLICATION: Carbon Steel Ermeto fittings on automatic transfer machine for making carburetor bodies. Operated with hydraulic oil at 120° F and 800 psi.

RESULTS: Utilization of Ermeto fittings saved the company 60 hours in installation time — thanks to the ease and simplicity of assembly.

WEATHERHEAD
BULK HOSE AND HOSE ASSEMBLIES

BULK HOSE
Twenty different styles available. From ¼" to 2" O.D. for working pressures up to 10,000 psi.

HOSE ASSEMBLIES
Completely fabricated with permanently attached swaged ends. Any size, any quantity for working pressures up to 10,000 psi.

Write for new general catalog — contains complete data and specifications for all items.

SAVED: 40 HOURS or $240

COMPANY: Emhart Manufacturing Company Hartford, Conn.

APPLICATION: Carbon Steel Ermeto fittings on pressure forming machine for small parts manufacture. Operated with hydraulic oil at 130° F and 1500 psi.

RESULTS: Ermeto fittings provided an estimated savings of 40 hours or $240 in installation time. Ermeto fittings were used specifically because of their ease of assembly.

BRASS & STEEL FITTINGS
HOSE & ASSEMBLIES
TOOLS & ACCESSORIES

WEATHERHEAD

FOR DETAILS
See Weatherhead catalog in Sweet's Product Design File, Plant Engineering File, the Fluid Power Directory, or write direct.

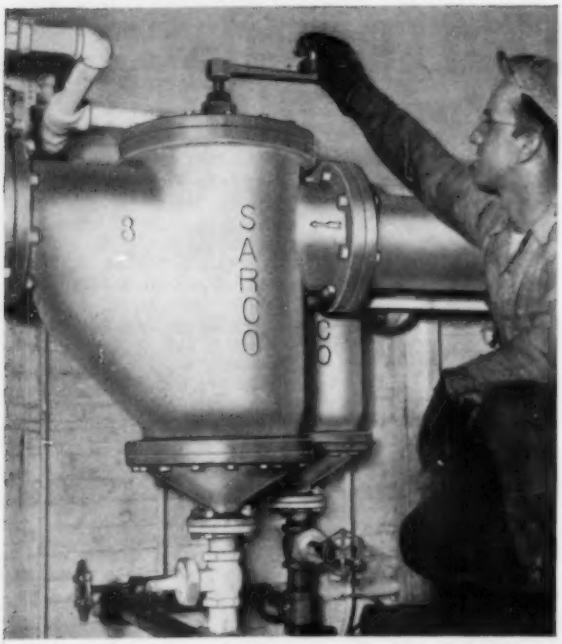
THE WEATHERHEAD CO., FORT WAYNE DIVISION
Dept. PL-9, 128 W. Washington Blvd., Fort Wayne, Ind.
In Canada:
The Weatherhead Co., Ltd., St. Thomas Ont.

For more facts circle 627 on Reply Card

SARCO TOPICS

How correct strainer selection protects equipment, maintains fluid flow, and prevents shut-downs

Strainers for wash water for power plant condensers cleaned without shut down



Sarco Type VRS Rotary Scraper Strainers enable operators to clear the screens with a few turns of the crank, without shutting down the line or dismantling the strainer.

Sizable quantities of water are required for cleaning condenser water screens at a power plant in California. Sea water is pumped for the purpose and must be freed from debris and sea life such as mussels and sardines. Further, any screening devices used must be capable of cleaning without shut-down.

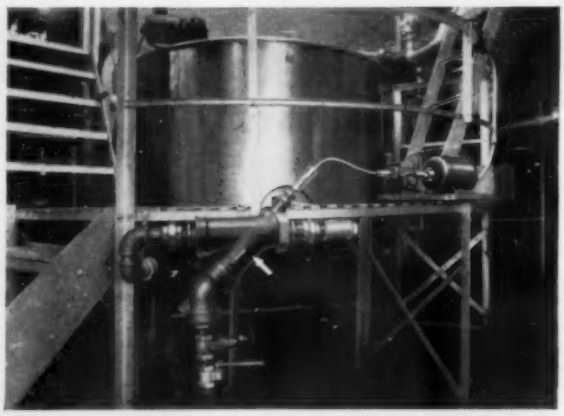
These problems were met by installing two Sarco type VRS scraper strainers ahead of the wash water pumps. This type of strainer is cleaned by rotating a spiral blade either manually or by motor drive. Motor-operated rotary-type strainers make it possible to clean the strainer continuously. The blade scrapes the screen clear, and collected solids are blown down from the strainer as required. Clean screens minimize pressure drop. The Sarco strainer installation has materially reduced maintenance hours and insured against temporary shut-down caused by clogged strainers.

Helical scraper knife clears screen without shutdown in East Chicago Air Conditioning System

Offices of the Inland Steel Company, at East Chicago, Indiana, are cooled with air conditioning units of 7½ tons and larger. Water for condenser cooling is pumped in from Lake Michigan.

Although passing through traveling screens, the incoming water still contained fine sand which clogged the screens. Frequent cleaning was required, and every now and again the units were practically out of service.

Plant engineers found their answer in Sarco Rotary Scraper Strainers, Type VRS. These units incorporate a hand-operated helical scraper knife within the cylindrical strainer screen. These scrapers made it possible to keep the strainers clean simply by cranking the scraper a few turns at regular intervals. Sand scraped off the screen is blown clear and discharged at pressure through a manually operated valve to waste. Now it is not necessary either to dismantle the strainer or shut down the unit.



IN PROCESS APPLICATION This Sarco motor operated-Scraper Strainer, Type SRS, is used to strain chocolate syrup in a processing application, providing continuous flow of fluid without shut-down for maintenance. 2167

For information on Sarco strainers, contact your Sarco sales representative, district office, or distributor; or write—

SARCO

SARCO COMPANY, INC.
635 MADISON AVENUE, NEW YORK 22, N. Y.
PLANT: BETHLEHEM, PA.
STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES

For more facts circle 628 on Reply Card

SARCO

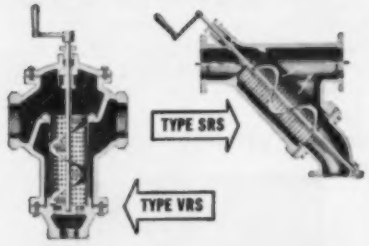
PIPELINE STRAINERS
help prevent shutdowns

HANDLE ALL MEDIA
condensate, steam, water, oil, and other piped fluids

PROTECT ALL EQUIPMENT
temperature and pressure regulators, steam traps, pumps, meters, burners, compressors, hydraulics, lubricators, and nozzles.

AVAILABLE IN ALL TYPES AND SIZES

SCRAPER STRAINERS
hand operated and motorized



SELF-CLEANING Y-TYPE

NEW! TYPE CT CAST STEEL, SPECIFICATION A.S.T.M. — A-216 Gr. WCB

Tensile strength 70,000 lbs. per square inch minimum, for saturated steam or liquids to 600 psi, non-shock and 750° F. total temperature.

Also Sarco Y-Type strainers in cast iron, brass, and semi-steel, screwed and flanged, all sizes and pressures.

For information on Sarco strainers, contact your Sarco sales representative, district office, or distributor; or write— 2166

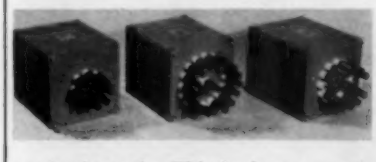
SARCO

SARCO COMPANY, INC.
635 MADISON AVENUE, NEW YORK 22, N. Y.
PLANT: BETHLEHEM, PA.

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

within 3 sec), and long-life contact-wiper switching design. When the unit is energized by a start button, a motorized double-end shaft rotates its wiping contact against a series of stationary contact tips—one for each burner in the system. This causes a high voltage impulse from ignition transformer to be fed to each pilot



spark electrode. This ignites a gas-air mixture at each burner position—the gas-air mixture having been released with actuation of the start button. The unit repeats until all burners are ignited.

A timing unit can be incorporated to activate the motor at any desired intervals for continuous, intermittent, or variable timed ignition. Standard units are for operation at 5 or 6000 v (10 or 12,000 v available). Ignitifiers come in seven modular capacities from eight to 32 and components are interchangeable with higher capacity units. Protection Controls, Inc.

▲ For details, circle 42 on Post Card

ELECTRIC HEATER wraps around steel drums

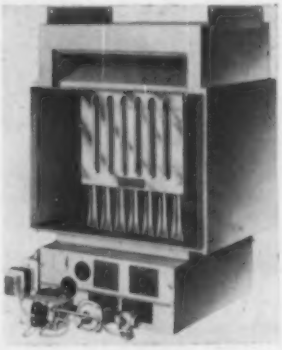
Electro-Flex Drum Heaters, designed to fit 21½ to 23½-diam steel drums, can be wrapped around the

drum and attached with a simple spring device. Once in position, the unit heats the drum and contents to desired temperature for easy removal of contents, or maintains even temperatures when required. The flexible heater bands are 2½ in. wide and one or more units can be used, depending on temperatures required. Units are grounded for safety, equipped with a 6-ft cord set with grounding cap. Cost per unit is $30.00. Electro-Flex Heat, Inc.

▲ For details, circle 43 on Post Card

DUCT FURNACES for downstream application

Installation of duct furnaces downstream of cooling surface in air conditioning systems is reported practical with these duct furnaces. They are A. G. A. approved for this application when equipped with optional stainless steel drain pan, says manufacturer, and their design offers many application opportunities. A built-in by-pass eliminates need for separate by-pass duct to handle the greater air requirements of systems which provide



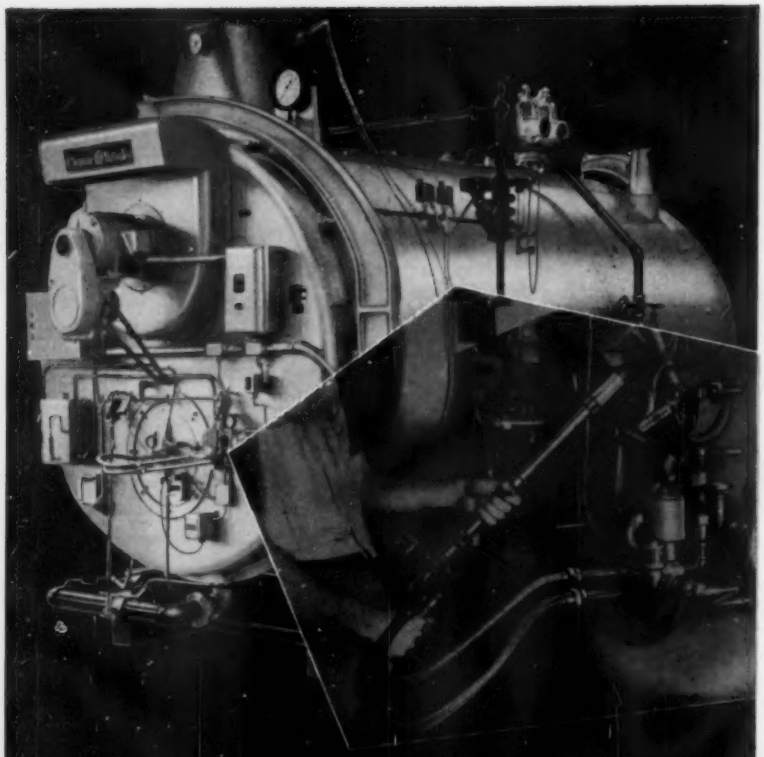
cooling. As a result, all air passes through the duct furnace, reducing internal static pressure.

For protection from moisture-laden air and condensation, burners are stainless steel; heat exchangers are stainless or aluminized steel, and casings are aluminized steel. Furnaces may be installed side by side in unlimited numbers within any one of three height groupings. Lint-free or non-aerated pilot burners serve to reduce pilot outage. Six sizes from 75,000 to 300,000 Btu/hr input, are available for use on natural mixed or LP gases. Controls are designed for 24-v service; can be converted to 115 and 230 v operation. Bulletin 659-B gives information. Modine Mfg. Co.

▲ For details, circle 44 on Post Card

BEARING LUBRICANT for extreme operating conditions

Key to improved performance announced for Permawick 280 is an extreme pressure additive formulated for bearing use. The self-wicking lubricant is recommended by manufacturer for applications involving high or low temperatures, marginal and



THIS BURNER NOZZLE CAN BE

pulled and replaced in 40 seconds!

On both oil-fired and gas-fired CB packaged boilers, an integral burner puts you money ahead with clean, economical combustion

The photo above shows how easy it is to withdraw the retractable nozzle from the boiler without removing bolts or opening the front head. The whole job takes less than a minute. That's just one of the features of the remarkable integral burner in every Cleaver-Brooks packaged boiler.

The Cleaver-Brooks air-atomizing oil burner atomizes and burns fuel oils (even #6) with low pressure air. Nozzle design determines degree of atomization. No further adjustment is necessary to produce high CO_2. Spray pattern of oil forms at a uniform angle — axial with the furnace — eliminating carbon build-up. Controls on the CB boiler regulate oil viscosity and pressure to the oil-metering valve. Air and fuel are mixed to the right proportions for high combustion efficiency. Burner nozzle and piping are purged on each cycle.

A word about gas firing:

The gas burner on gas-fired CB boilers offers the same well-engineered design. Gas burner on even the largest CB boilers requires less than a pound of gas pressure to operate — an advantage when gas supply pressure is low. You can also select combination burners — quick change-over from oil to gas or reverse.

Write for more information today. Packaged fire tube boilers — sizes through 600 hp for steam or hot water. In larger capacities, Cleaver-Brooks offers Springfield packaged and field-erected water tube boilers. **Cleaver-Brooks Company, Dept. K, 364 East Keefe Ave., Milwaukee 12, Wisconsin.**

Cleaver Brooks®

ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

For more facts circle 629 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

boundary lubricating, and high thrust loadings for vertical shaft positions. It is even reported effective in quieting stubbornly noisy bearings. In addition to improving operating characteristics of both babbitt and sintered bronze bearings, Permawick 280 shows improved resistance to degradation and consequently longer life than many wicking lubricants or mineral oils, according to company. Permawick Co.

For details, circle 45 on Post Card

HEAVY-DUTY DRILLS offer more power, more uses

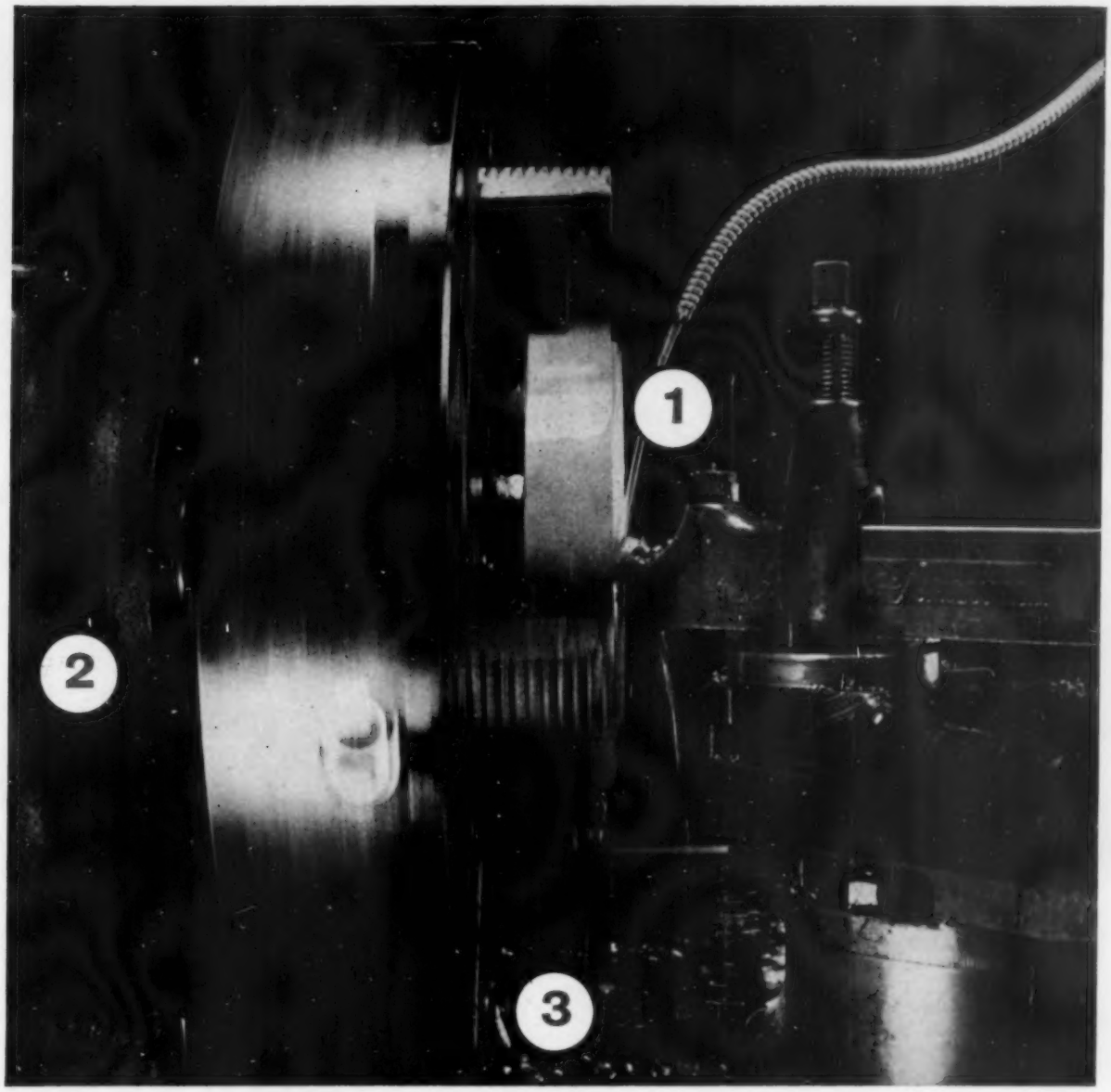
This series of 10 heavy-duty precision drills, in ¼- to ⅜-in. sizes, feature increased power, variety of chuck capacities, and wider range of applications. They are designed for wood, metal, brick, cement block and plastic, with speeds ranging from 750 to 5000 rpm. The series includes an economy, all ball-bearing drill (shown)

for ductwork and aircraft sheet metal; pistol grip models for precision work where correct speed is a factor; a "D" handle drill for "in-line" drilling operations. One model features a keyless chuck which can be tightened or released by a twist of the fingers. All models have a gasket-sealed gear box to provide efficient lubrication over longer periods without leakage. Porter-Cable Machine Co.

For details, circle 46 on Post Card

CHEMICAL TREATMENT checks pitting, corrosion

Stop-Pit is announced as a liquid chemical treatment that stops pitting, corrosion and scale formation in low pressure steam and hot water heating systems. A built-in color indicator shows how much treatment is re-



CUT THROUGH PRODUCTION LAGS WITH ESSO LUBES

1. Fanox® high-wetting, non-staining oils for use in cutting non-ferrous metals and for quenching and drawing all metals. The low viscosity of Fanox 32 helps boost the heat dissipation rate to speed the work . . . as in the aluminum machining above.

2. Nuto® oils protect highly finished gear surfaces from excessive wear and rust. Resist foaming to assure ample lubrication. Oxidation inhibited to prevent sludging . . . provides month-after-month service.

3. Febis® K lubricants insure smooth-sliding ways . . . boost precision by eliminating "stick-slip" movement. These lubes actually make static friction less than sliding friction; easily pass the stick-slip test.

There's a complete line of specialized Esso Lubricants to help you cut through production lags. Contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, N. Y.

Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

For more facts circle 630 on Reply Card

HOW MUCH DOES *UNPLANNED* DOWNTIME COST IN YOUR PLANT? $1000...$5000...$10,000 an hour?

In many cases the costs in spoiled processes and lost production amount to several times those figures.

You Can't Bargain With Trouble!

Only preventive measures will reduce it. Periodic inspection of important electrical equipment with a Megger® Insulation Tester, and the records of these tests, will provide the data you need to anticipate trouble—to prevent production line interruptions.

Buy Prevention—Improve Profits

Megger "instruments for prevention" cost only a small fraction of the price of equipment failure, work spoilage and the many other wastes that help to destroy the profits picture.

An investment in a Megger Insulation Tester is like the premium on an accident policy except that the Megger Tester can be the means of preventing the accident.

Preventive Maintenance Is Productive

Any production department will thank and even praise a *preventive* maintenance department for its ability to spot trouble before it happens.

We have the answers—want them?

Write for Electrical Preventive Maintenance material—File 21-PL

MEG® TYPE OF MEGGER INSULATION RESISTANCE TESTER—Available hand-operated, rectifier operated, or with a separate rectifier. Ranges up to 2000 megohms and 1000 volts d-c in all three models. BULLETIN 21-45-PL.

MEGGER GROUND TESTER measures the resistance of earth to ground connections simply, easily and accurately, and thereby helps to determine whether such connections will perform the services for which they were designed and installed. BULLETIN 25-PL.

MEGGER LOW RESISTANCE OHMMETER—Battery or rectifier operated. Four ranges 0-1000 microhms to 0 to 1 ohm. New clamp type test leads 18 ft. long enable one man to make tests. BULLETIN 24-46-PL.

B1014

BIDDLE INSTRUMENTS

JAMES G. BIDDLE CO.

Electrical & Speed Measuring Instruments

1316 ARCH STREET • PHILADELPHIA 7, PA.

For more facts circle 631 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

quired. Standard initial doses required are one gallon per every 250 gal of water in circulating system boiler. After this initial dosage, small amount is required to maintain protection. Dearborn Chemical Co.

For details, circle 47 on Post Card

Use the Reader Service Cards provided on page 291-292 to ask for more information on equipment. Circle item numbers of products in which you are interested.

PIPE, FITTINGS made of high density plastic

Included in the Poly III line—to reach volume markets this year—are pipe in 1½-through 2-in. sizes made of high-density polyethylene and fittings of polypropylene. A 50-year life

expectancy is announced for Poly III, and because of its simplicity of installation, one man with only three basic tools can do the job. Industrial applications include piping of corrosive acids, brine and alkaline solutions. Crane Co.

For details, circle 48 on Post Card

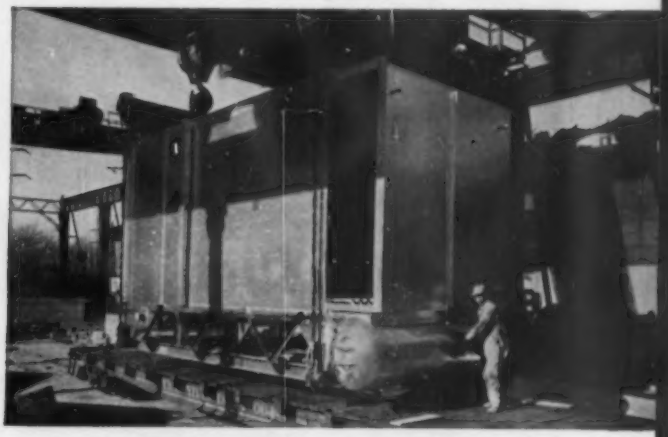
RIGID VINYL SHEET for ceiling lighting systems

Soundsheet is announced as a rigid vinyl sheeting which provides both light diffusion and balanced sound absorption. Adaptable to most existing over-all lighting equipment, Soundsheet consists of a vinyl sheet perforated with tiny holes. To both sides is laminated a thin layer of paper saturated with Geon vinyl latex, a product of B. F. Goodrich Chemical Co. reported effective for this purpose because it imparts dimensional stabil-

To 90,000 lb/hr . . . Type VP—A compact, economical, natural circulation, *package* boiler for the majority of industrial requirements. Steam capacities from 4,000 to 90,000 lb/hr; pressures to 700 psi; temperatures to 750 F. Most sizes shipped complete with firing equipment for oil or gas, setting and forced draft fan arrangement.

To 120,000 lb/hr . . . Type PCC—Shop-assembled *controlled circulation* boiler providing high output and high temperatures in a compact, high-performance unit. Capacities—80,000 to 120,000 lb/hr; pressures to 1,000 psi; temperatures to 900 F. Designed for minimum installation, operation and maintenance costs.

To 50,000,000 Btu/hr . . . Type HCC—High-temperature water boiler, shop-assembled, widely used for large-scale, economical heating of commercial and industrial installations—including many military air bases. Controlled circulation, pressurized oil or gas-fired from 10 to 50 million Btu; coal-fired to 40 million Btu. Field-assembled units to 300 million Btu.



To 50,000 lb/hr . . . Type WCC—Shop-assembled. Utilizes waste heat from open hearths or chemical processes. C-E controlled circulation design obtains big boiler performance from space-saving units. Capacities to 50,000 lb/hr—and up, depending on waste heat conditions—with pressures to 450 psi and temperatures to 750 F. Capacities of field-assembled units are virtually unlimited.

shop assembled to 120,000 lb/hr capacity

Designed for Industry by UTILITY-BOILER ENGINEERS

C-E shop-assembled boilers are available for a wide range of industrial, commercial and institutional applications. They are produced by the same C-E engineers who design the world's biggest and most efficient utility boilers—with capacities to 4,000,000 lb/hr and pressures to 5,000 psi. For the most economical solution to *your* steam or high-temperature water problems, write to C-E, outlining your requirements. ***Catalogs are available.***

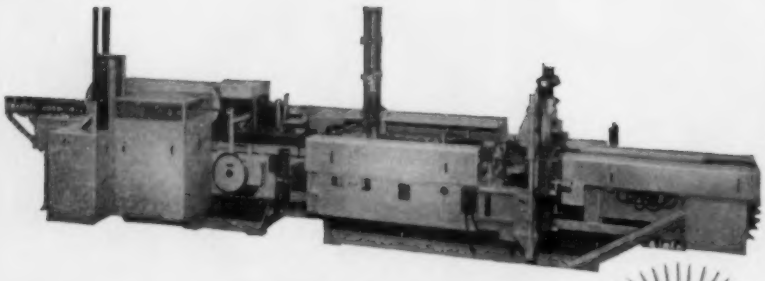
COMBUSTION ENGINEERING

Combustion Engineering Building,
200 Madison Avenue, New York 16, N. Y.
CANADA: COMBUSTION ENGINEERING-SUPERHEATER LTD.

C-277-A

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 632 on Reply Card

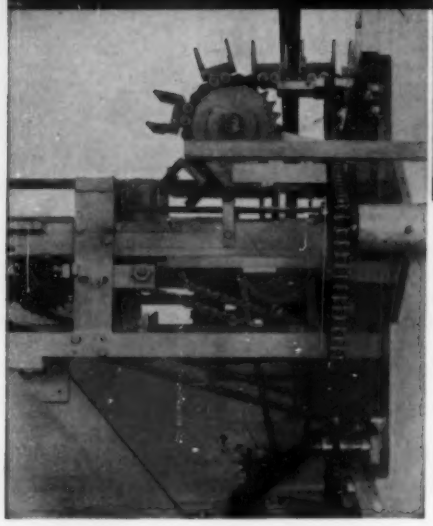


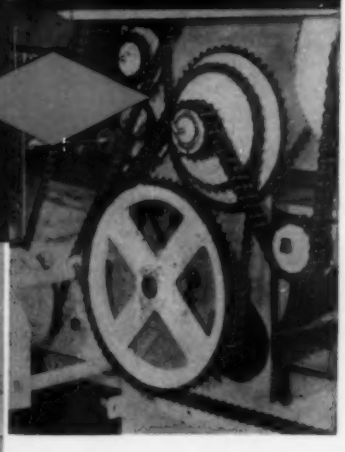
YOU CAN'T BEAT THIS WRAP!

Redington wrapper makes fast work of Listerine pack.. with action SYNCHRONIZED by

DIAMOND

ROLLER CHAIN





Redington wrapping machines, used by Lambert-Hudnut Manufacturing Laboratories conveys, and applies corrugated liners, circulars, end protectors, wrappers and seals to Listerine bottles at the rate of 120 per minute. DIAMOND Roller Chains maintain perfect synchronization of the complex operating cycle.

◆ DIAMOND Roller Chain is the ideal choice for power driven mechanisms employing synchronized, multiple shaft movements. DIAMOND'S precision manufacture assures the uniform pitch and close total-length tolerances essential to accurate timing.

DIAMOND ENGINEERING SERVICE IS AVAILABLE. Write, giving full details of your problem. DIAMOND CHAIN COMPANY, INC., *A Subsidiary of American Steel Foundries*, 402 Kentucky Avenue, Indianapolis 7, Indiana. Offices and distributors in all principal cities.

DIAMOND ROLLER CHAINS ®

For more facts circle 633 on Reply Card

PLANT ENGINEERING EQUIPMENT

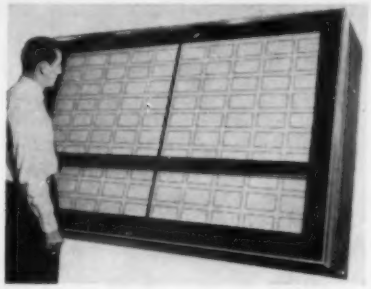
(Begins on page 206)

ity and tear strength to the paper while enhancing the sheet's flame resistance and stability to light exposure. The latex saturated paper, supplied by Fibre Leather Mfg. Co., increases sound absorption. It forms a thin flexible membrane over the perforations, turning them into tiny sound traps. Soundsheet comes in both translucent or opaque sheets in corrugated or flat form, and in decorative preformed units, in a variey of colors. The sheets are light in weight, have a washable surface. Contrex Co.

▲ For details, circle 49 on Post Card

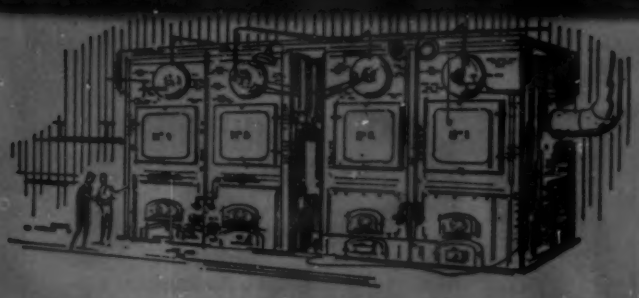
MULTIPLE RECORDER makes up to 400 analog recordings

The K-Logger, a multiple recorder and annunciator, records and displays, on one chart, all variables in a process, and is a miniature graphic panel in its own right. Concentrating accumulation and display of process data into one unit allows control rooms and instrument panels to be smaller—enabling an operator to watch all aspects of a process operation. The K-Logger makes from 10 to 400 analog recordings, at rates up to 10 points per second, in 4-by-6 in. chart frames printed

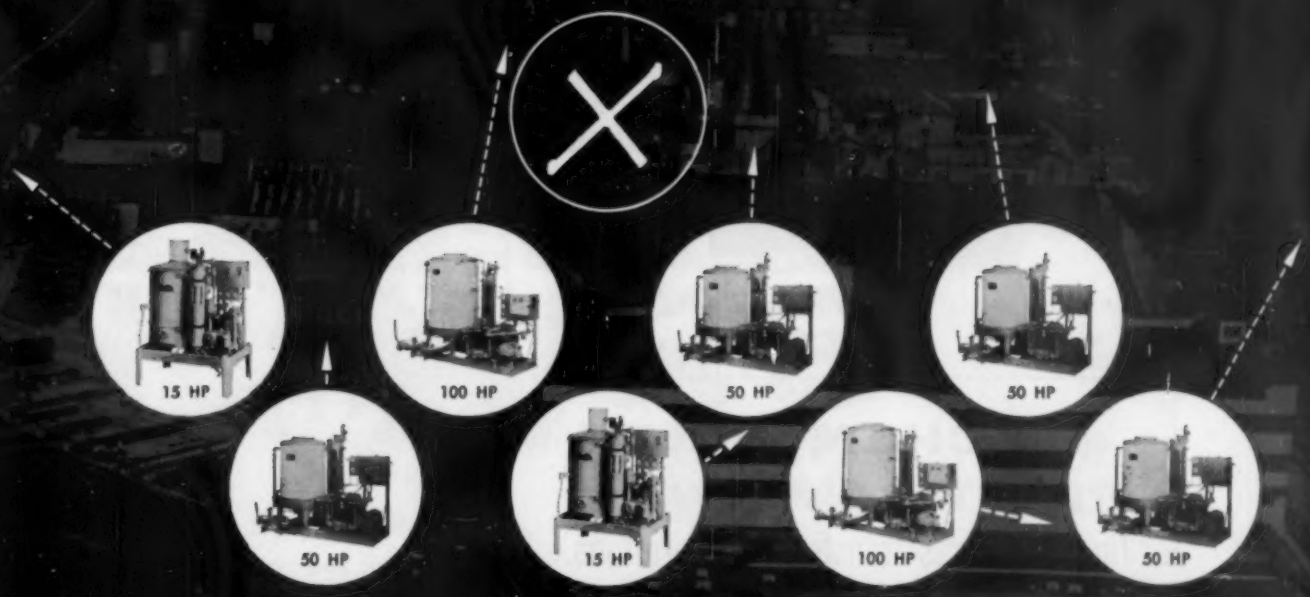


in columns and rows on one large sheet of paper. Each frame has an independent calibration and both pneumatic and electric signals (including thermocouples) can be mixed on one recorder.

The large chart, up to 4-by-6 ft, is held against a translucent platen, or printing surface. Fluorescent lights behind the platen provide soft illumination. Transparent process symbols of colored plastic film are applied to the platen and show through to form a graphic panel with full color-coding. Recorded traces are continuous lines of dots, printed by electrically operated printers. Traces can be printed in four different colors. After removal from the K-Logger, the chart be-



Central Boiler Room ..... as obsolete as the line shaft



W. P. FULLER & CO. SAVES BIG MONEY WITH CLAYTON'S MODERN Decentralized Steam

Here's how: 8 compact Clayton Steam Generators were installed, each close to a point of use. Total cost—*less* than the cost of replacing just the old steam mains. And by eliminating these inefficient lines, ⅓ of the total HP requirement was saved. Entire central boiler room space was freed for plant expansion. The old 75-foot stack was retired. Fuel savings were 50%. Personnel costs were reduced.

These savings were proven at W. P. Fuller & Co., South San Francisco. All depend on the extreme compactness, fast steaming and operational economy of the Clayton. In your own plant, large or small, decentralized steam savings like this are entirely practical. Write for full information.

420

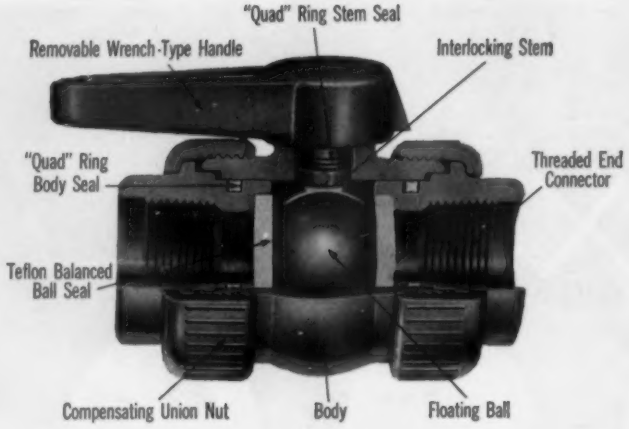
Clayton MANUFACTURING COMPANY

463 No. Temple City Blvd., El Monte, California

For more facts circle 634 on Reply Card

INERT TO CORROSION...

full flow ball valve—1/4 turn off!



specify **CHEMTROL PLASTIC VALVES**

for liquid and gas transferring operations.

Here's a complete line of plastic valves that *cuts replacement costs and downtime* wherever acids, alkalies and many solvents are handled! CHEMTROL VALVES feature quick ¼ turn shut-off, no direction change to cause turbulence or loss of pressure, no sticking or scaling, no contamination to pure solutions. Broad chemical resistance as well as good performance in high temperature ranges. With union type end connectors, valves are quick to disassemble and seats are adjustable for takeup.

Available in 5 basic plastic materials and an extensive size range.

CHEMTROL IS THE *LEADER* in plastic valve manufacture... proved over the years! Dealers in all major industrial areas.

Ball Valves

Check Valves

3-Way Valves

Foot Valves

Cock Valves

Globe and Needle Valves

WRITE FOR FREE CATALOG Ask for recommendations!

CHEMTROL
404 West Central Avenue, Santa Ana, California

For more facts circle 635 on Reply Card

PLANT ENGINEERING EQUIPMENT

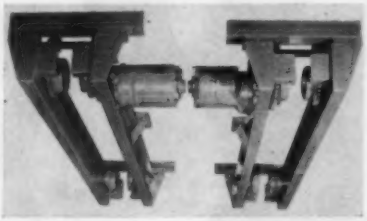
(Begins on page 206)

comes a log sheet with records plotted as curves on graphs. Annunciator contacts are provided on each chart frame, with alarm lights behind the platen, so they also appear in color, or flashing sequence, superimposed on the chart frame where the off-normal variable is recorded. Keinath Instrument Co.

▲ For details, circle 50 on Post Card

CRANE COMPONENTS offer do-it-yourself advantages

For plant engineers planning to assemble their own overhead cranes, this manufacturer introduces crane end trucks and accessories—all necessary components except the structural steel bridge girder and the drive shaft. The line includes 18 ratings for spans



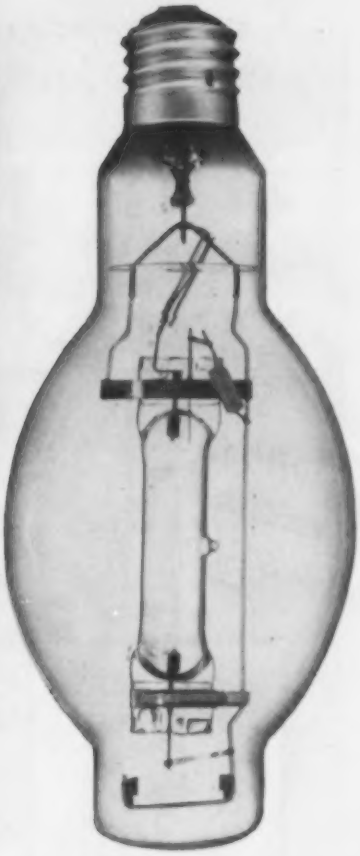
to 50 ft; load capacities range from one to 10 tons. Light-duty models are motor-driven, either top-running or underhung construction. They are powered by a head-mounted motor on each end truck. Heavy-duty models are motor-driven, top-running and hand-geared top running. Torque arm center drive assemblies are available for the heavy-duty designs. These drives are shaft-mounted, eliminating need for heavy structural support members. Other accessories available are magnetic controls, current collectors and cross shaft bearings and couplings. Hoist & Crane Div. Robbins & Myers, Inc.

▲ For details, circle 51 on Post Card

CONVERTER transfers data for computer reading

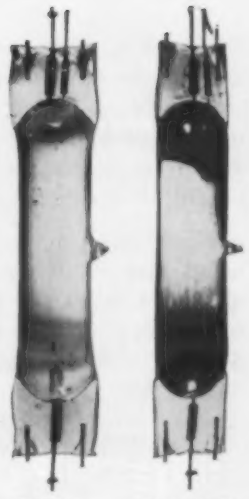
IBM 7765 transfers data from punched paper tape to magnetic tape. It is designed to write magnetic tape that can be read by a computer at 15,000 or 22,500 characters a second. Those transmitting data with paper tape devices thus can achieve computer input at several times the speed of direct paper tape input. The solid state 7765 is expected to bring paper tape users into the sphere of IBM Tele-processing

6000 USEFUL HOURS EXTRA



New G-E "Bonus Line" Mercury Lamps. 6000 extra hours! That's the bonus you get in every 400-watt G-E "Bonus Line" Mercury Lamp . . . and a minimum of 3,000 hours extra in the other wattages. One look at these two light-producing arc tubes and you can see why General Electric "Bonus Line" Mercury Lamps are your best bargain. See how the one from a G-E Lamp stays white? That's because its special electrode doesn't deposit a *black* coating, but a translucent *white* coating that lets the light come through. The result: you get as much light at *9,000* hours as ordinary mercury lamps give at *3,000* hours. General Electric "Bonus Line" lamps now available in *all* sizes from 100 to 1,000-watts . . . in all popular shapes and "colors". . . *at new low prices.*

Men in the know . . . know they get important differences when they specify General Electric Lamps—whether they're mercury, filament or fluorescent. So let your General Electric Lamp distributor explain the important plus you can get in the lamp types you use. General Electric Company, Large Lamp Department C-033, Nela Park, Cleveland 12, Ohio.



BONUS ARC TUBE AFTER 8000 HRS.

ORDINARY ARC TUBE AFTER 8000 HRS.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 636 on Reply Card

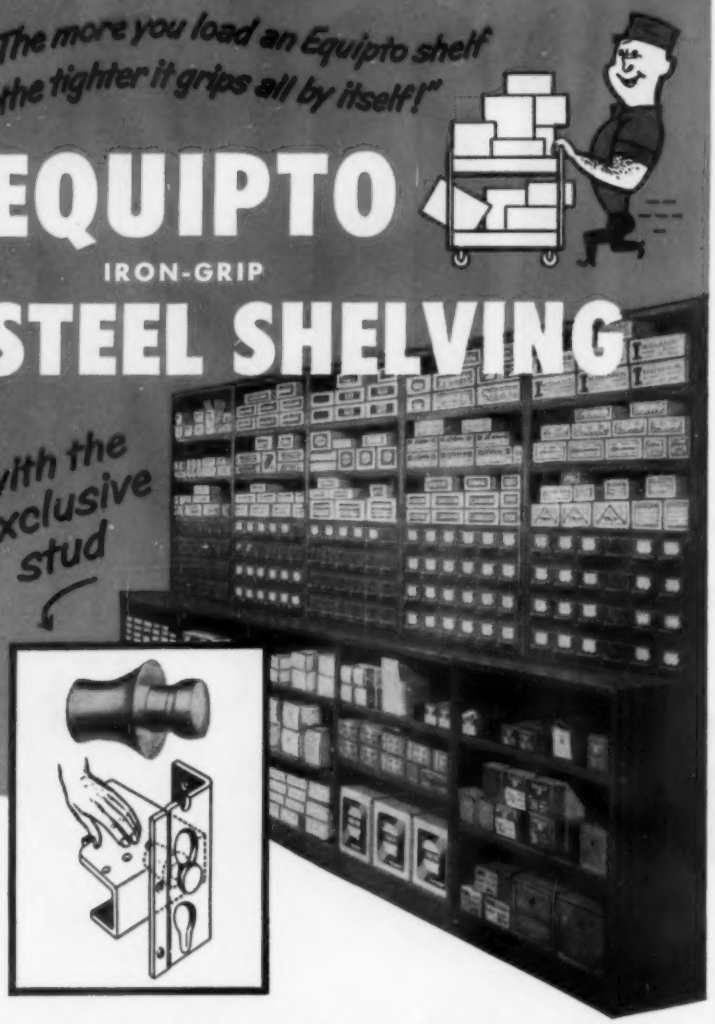
"The more you load an Equipto shelf the tighter it grips all by itself!"

EQUIPTO

IRON-GRIP

STEEL SHELVING

with the exclusive stud



No nuts, bolts or tools needed when adjusting Equipto Iron-Grip Shelving. Exclusive steel stud permits 60% faster shelf adjustment on 1½" centers. The more you load it, the tighter it grips, yet shelf may be moved easily. You can vary arrangement of drawers, dividers, or shelves to suit changing storage needs. Four uprights per unit allow units to be moved without disturbing adjacent units.

Equipto Iron-Grip Shelving is immediately available from stock in all sizes, either open or closed, with or without dividers, bin fronts, drawers or label holders. Write today for complete reference manual No. 485; also free booklet "HOW TO SOLVE YOUR STORAGE PROBLEMS".

SHELVING BENCHES DRAWER UNITS LOCKERS EQUIPTO ROBE STOCK CARTS EQUIPTO ANGLE

Equipto

744 Prairie Avenue
Aurora, Illinois

For more facts circle 637 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

—transmission and processing of business and scientific data over physical distance. Previously, it is pointed out, a large company mailing or telegraphing paper tape from field offices to computer headquarters might have converted the paper tape to punched cards, for relatively slow entry to the computer. For somewhat faster input, it would have to make a second conversion from cards to magnetic tape. In either case, manufacturer notes, the IBM 7765 will save time overall, reduce punched card costs, and minimize chance of human error in the conversion process. The machine will rent for around $1500 a month, sell for under $70,000. International Business Machines Corp.

▲ For details, circle 52 on Post Card

LIMIT SWITCH is light, compact, heavy duty type

For mill and general industrial use, this lever limit switch, No. 1C9445, is reported to give improved service on cranes, hoist, industrial conveyors and elevators, and as a pilot circuit device to limit travel or setup functions at pre-determined positions. Key improvement of this switch its built-in versatility, acording to manufac-

turer. It may be adjusted to provide more than 100 contact and lever combinations, according to a plant's changing needs. No extra parts are required, and a screwdriver and small wrench are the only tools needed. Available for two-or four-circuit operation, the switch features a smaller, lighter, yet more rugged enclosure and is designed to withstand extreme vibration and shock.

Available enclosures include general-purpose, weatherproof, water-tight, or dust-tight in NEMA Types 1, 3, 4 or 5. Switches may be base or side

For more facts circle 638 on Reply Card →

ONE MAN ONE TRADE ONE TOOL

...your production line back in operation in

30 SECONDS

(if it's a Hunt PDQ Air Control Valve)

☑ **accessibility** ☑ **simplicity** ☑ **speed and capacity** ☑ **price and quality**

No bulletin can do it justice...have the Hunt man call. Write to:

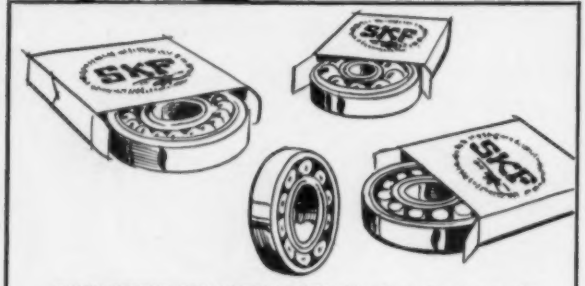
HUNT HUNT VALVE COMPANY DIVISION OF IBEC SALEM, OHIO

Quick-As-Wink AIR & HYDRAULIC CONTROL VALVES

DISTRIBUTOR DAN, the SKF bearing man, shows

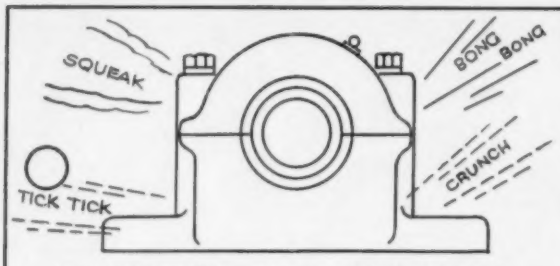
HOW TO CHECK BEARINGS DURING RUN-IN

—to prevent damage and downtime later!



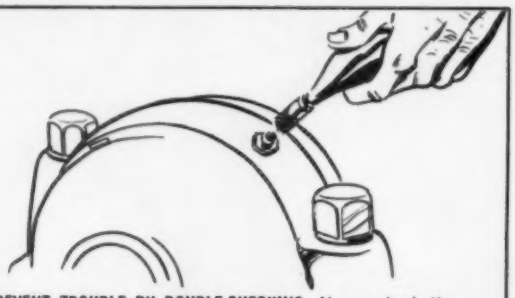
THINK BEFORE YOU INSTALL THEM. The first few hours of operation are the most critical in a bearing's life. So, operate the bearing at reduced speed and load during run-in. Bearing run-in periods vary from a few hours to a few weeks, but 24 hours is usually sufficient.

NOISE CAN BE A SYMPTOM. A soft, purring sound is all you should hear from a bearing—if it's operating correctly. Check by placing the blade of a screwdriver and listening at the handle. Any other noise means trouble sooner or later.



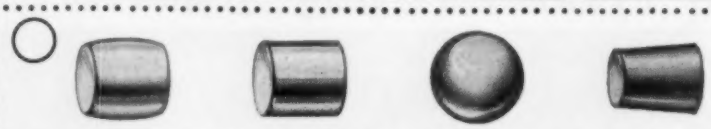
KNOW YOUR NOISES. Squeaking means inadequate lubrication. Metallic tones indicate shaft or housing interference or improper adjustment. Smooth, clear tones tell of marks in the stationary raceway. Intermittent noises indicate a damaged ball. Crunching means dirt.

TOO HOT TO HANDLE? There's trouble brewing if the housing feels excessively hot. High temperature usually indicates overlubrication or use of a lubricant with too high viscosity. It can also be a sign of excessive axial or radial preloading, misalignment, tight-fitting seals, or rubbing.



PREVENT TROUBLE BY DOUBLE-CHECKING. Always check the bearing after the critical run-in period. Examine the lubricant. If it's dirty, change it. Check the seals for signs of wear or damage. A few minutes spent double-checking now eliminates chances of costly damage and downtime later.

Baffled by a bearing problem? Whether it's selection, mounting or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.



Spherical, Cylindrical, Ball, "Tyson" Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U. S. PAT. OFF.

For more facts circle 639 on Reply Card

PLANT ENGINEERING EQUIPMENT

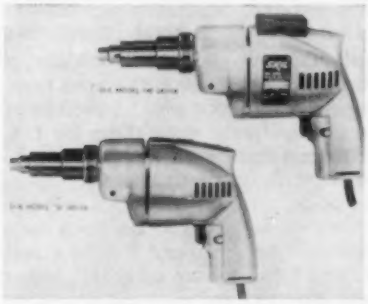
(Begins on page 206)

wall mounted. Versatility is further increased by interchangeable lever arms. General Electric Co.

▲ For details, circle 53 on Post Card

POSITIVE CLUTCH DRIVER has low-cost feature

Model 139 and Reversing Model 140 drivers are built for light to heavy duty production use, plant maintenance and all types of installation work. Their low cost (under $50) makes them excellent for use wherever



power fastening can speed up work, company notes. Positive clutch is designed to deliver powerful torque and stay engaged as long as pressure is applied by operator. When desired tightening is obtained, operator simply lifts driver and clutch disengages. Both models have trigger switch, pin for locking in "on" position, die case aluminum housing, quick change finder. Skil Corp.

▲ For details, circle 54 on Post Card

REFRIGERATED DRYER is medium capacity unit

Model F-100 is designed to cool compressed air to 40 F at pressure, to relieve the air of its moisture and oil vapor content. The dryer employs the principle of Freon-circulated closed loop refrigeration to accomplish its compressed air drying—no prefilters or aftercoolers are necessary. This medium capacity unit is rated at 30 scfm at 100 psig, 100 F inlet air temperature, and 75 F ambient temperature. When compressed air is dehydrated at this elevated pressure, then reduced for instrument service, atmospheric dew points of —5 F are possible, company states. The unit itself combines a ½-hp refrigerating section, condenser-evaporator-type heat exchanger, replaceable filter element, and automatic discharge mechanism in an in-

"Tough Buyers" find what they need in the Reznor line of direct-fired heaters

The reason is simple. Reznor has more types and sizes to choose from:

- Money-saving, space-saving unit heaters with three control options, propeller or blower fans, 25,000 to 30,000 Btuh.
- Low cost, versatile duct furnaces in capacities of 50,000 to 300,000 Btuh and up, for central heating, year-round air conditioning, or heating of make-up or process air.
- Matching, quiet-operating blower packages, if a separate air handler is needed.
- The new Reznor Venter, an automatic vent exhauster that lets you install Reznor unit heaters almost anywhere.
- Effective, five-way heaters for high ceiling applications, 300,000 to 600,000 Btuh.
- Heavy duty, forced air heaters, 400,000 to 2,000,000 Btuh, that you can floor-mount or suspend, and use with air discharge nozzles or ductwork.

Ask your Reznor representative for a copy of Catalog SA-5900, with complete data on all Reznor heaters. Or write Dept. 91U, Reznor Manufacturing Co., Mercer, Pa.

REZNOR HEATERS

"WORLD'S LARGEST SELLING DIRECT-FIRED HEATERS"

For more facts circle 640 on Reply Card

NO END OF USES IN A PLANT FOR THIS AIR COMPRESSOR ON DO-ALL TRACTOR!

1 Schramm Heavy Pneumatractor is two hard-working units in one!

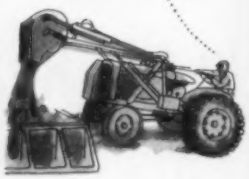
Schramm full 125 cfm compressor here.

plus... husky tractor with back-hoe and front end loader

2 saves time, manpower—two ways

one man drives compressor anywhere air is needed...

same man uses Pneumatractor to dig, scrape, haul, grade, fill, etc... etc...



3 you end

towing pushing lost time

4 and you save when you buy

Tractor	$ 3,600
Loader	$ 2,250
Backhoe	$ 3,900
Schramm 125 cfm Compressor	$ 3,720
	$13,470

Schramm Heavy Pneumatractor . . $12,421.50

if bought separately at average prices

Schramm Heavy Pneumatractor is the handiest workhorse in the plant! Write for Catalog 5740 today.

Schramm PNEUMATRACTORS
Self-propelled Air Compressors
665 North Garfield Ave., West Chester, Pa.
For more facts circle 641 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

sulated ASME coded pressure vessel.

A feature noted is continuous service without need for cycling or on-off service, made possible by a hot-gas by-pass arrangement which regulates amount of Freon introduced into the condenser-evaporator and permits low dew points to be maintained despite load or temperature variance. The unit operates on 115 v, 60 cycle, single phase electrical current. Operating costs are said to run under 25 cents a day. Hankison Corp.

For details, circle 55 on Post Card

PLASTIC PIPE withstands more heat, chemicals

Many previous temperature and chemical limitations of plastic pipe are claimed to be overcome in this glass fiber, thermosetting, corrosion service plastic pipe. A product of Reflin Co. it utilizes an isopolyester resin (Dion-Iso DR-661) originated by Chemical Process Co. This pipe is reported to operate satisfactorily in continuous duty up to 350 F and to handle acids, alkalines and many solvents with ease—even hydrochloric acids and potash fluids up to 20 percent concentrations. Also announced for this plastic pipe are more fatigue resistance, greater durability, higher strength and improved chemical and physical properties. It is suggested for corrosion service applications in refineries, food, chemical, petroleum and other industries, comes in five sizes from 4 to 12 in. OD. Reflin Co.

For details, circle 56 on Post Card

POWER TRUCK moves loads over stairs

The Stair Cat is a two-wheeled, electrically driven hand truck, utilizing General Electric Co.'s Form G motor, for mechanized movement of loads up to 500 lb up and down stairs, at a rate of 18 fpm. It is 5 ft long and 2 ft wide, and furnished with a 40-ft cord which can be plugged

into a 115-v outlet. The operator has only to guide the truck, it is pointed out, and automatic braking is provided so that with power turned off, or in event of power failure, the unit will not move. After being loaded, the Stair Cat can be wheeled to stairs and positioned for automatic movement. The strap is automatically wound into a coil, out of the way, when loosened, and has a steel ratchet for tightening it around the load. New Design and Development Corp.

For details, circle 57 on Post Card

COATING gives two-way corrosion protection

Seculate is described as an easily-applied coating which dries to a rock-hard, off-white film which prevents condensation by two-way action: surface insulation; and absorption of small amounts of moisture followed by later release as the humidity drops. It can be brushed or sprayed on to practically any metal or building material, says manufacturer. The coating is said to resist growth of most fungi and molds, to resist fire, and to adhere to vibrating surfaces. Bulletin 1 gives test data. Chemical Concentrates.

▲ For details, circle 58 on Post Card

WALL COVERING affords economical protection

Armobond, a continuous tile-like wall material, is described as an engineered system of odorless, epoxy fiber-glass surface coating. Plaster, wood, metal, plastics, masonry, concrete, cinder block, cement block, wallboard and particle material can be covered with it. Armobond comes in a variety of colors and is claimed durable, waterproof and resistant to abrasion and chemical corrosion. It costs about half as much as tile, according to manufacturer, and about a third as much as vitrified block. Deerfield Coatings, Inc.

▲ For details, circle 59 on Post Card

LUBRICATOR has quick-change bowl

By pressing the locking lever of Model 3014 Airline Lubricator, and twisting the bowl, the bowl will come off without necessitating turning off air line. This permits cleaning or replacing bowl without interrupting operation. Transparent bowl holds 12 oz. Units will lubricate air cylinders, valves, motors and tools. They cannot be used where surrounding temperatures might go above 120 F, or on air pressures greater than 150 psi. Circular 1028 gives information on the lubricator. Wilkerson Corp.

▲ For details, circle 60 on Post Card

DYE-PENETRANT SYSTEM detects surface flaws

Pixchek is announced as an effective and economical means of finding defects in exteriors and open sub-surfaces of metals, ceramics, glass and most plastics. This dye-penetrant system is available in a compact kit containing both spray and liquid cans for on-the-spot inspection. It also comes in bulk for production line installations. Unseen flaws are made visible with Pixchek by action of a chalk-white developer on a low-viscosity red dye. The dye penetrant is drawn up by the developer from the defect to make a red stain pattern on a white surface. Interpretation of this "blood stain" pattern reveals type of surface flaw. Picker X-Ray Corp.

▲ For details, circle 61 on Post Card

SYNCHRONOUS MOTOR for heavy duty use

Slo-Syn Type SS250 has a torque of 250 oz-in. and constant speed of 73 rpm; it is suggested for service as a prime mover for controlling valves, temperatures, machine tool carriages and similar automatic or semi-automatic applications. This permanent magnet type synchronous motor can be started, stopped or reversed with a single-pole, three-position switch, company announces.

For General Use buy
RIDGID
Heavy-Duty Pipe Cutters

Factory tested for perfect tracking, here's your best cutter buy for hand use. Extra-long shank protects threads, gives fast, easy adjustment. Large handle for sure grip . . . more leverage. Strong, special malleable frame won't bend or warp. You'll also need the RIDGID Wide-Roll Cutter, that tracks perfectly at high power-drive speeds, and the RIDGID 4-Wheel Cutters, that give quick, clean cuts in tight places with only quarter turns.

Five Sizes for ⅛" to 6"

For Tubing and Thin-Wall Conduit buy
RIDGID
Tubing Cutters

Five Sizes for ⅛" to 4"

Exclusive fold-in reamer on Nos. 10, 15 and 20 protects hands and pockets . . . reams full cutter capacity. Thin-blade wheel gives quick, clean cuts. Rollers smooth tubing ready for soldering. Special RIDGID No. 315 3-Wheel Cutter gives fast cuts in hard-to-get-at places.

There's a RIDGID Cutter to save you time on every job. Call your Supply House today!

RIDGID
The Ridge Tool Company • Elyria, Ohio, U.S.A.

For more facts circle 642 on Reply Card

makes PENNSYLVANIA COMPRESSORS run efficiently...silently...with minimum maintenance.

Stainless steel valve discs lift against a cushion of air in the simple, efficient design of the Air Cushion Valve that makes PENNSYLVANIA Compressors run so silently, so dependably, and with such low maintenance requirements. Air Cushion Valves have no nuts, bolts, or screws to break or burn fast. You get longer valve life . . . eliminate wear . . . eliminate noise caused by metal striking metal. Flat valve discs have no flexing or bending action to weaken or distort them. And the valve springs are highest grade stainless steel, rolled on edge, insuring maximum strength and durability. There is just one spring for each disc, and it bears evenly on the entire surface.

But this is only part of the PENNSYLVANIA story. Learn all the facts in "Compressors for Industry". It describes PENNSYLVANIA Compressors from 10 to 350 hp, horizontal, angle, and OILFRE models. Write to Dept. B-8 for your copy today.

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY
Easton, Pa. • Earning Customer Confidence Since 1920

For more facts circle 643 on Reply Card

PLANT ENGINEERING EQUIPMENT

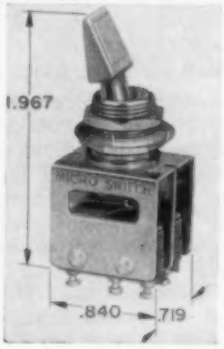
(Begins on page 206)

When used as an incremental positioning device, d-c voltage applied to field windings converts one revolution of motor shaft into 200 precise steps. A planetary gear model is available for applications requiring torque of 650 oz-in., 16.6 rpm. The Superior Electric Co.

For details, circle 62 on Post Card

TOGGLE SWITCH keeps tabs on positions

Requiring about 1 in. of space behind control panels and weighing 1/14 oz, the 400 series of toggle switches feature bright aluminum tabs to provide instant position indication. Switches are available in both momentary and maintained-contact versions, for use in electronic equipment, data processing systems, industrial consoles and other areas. Each toggle operates snap-action switches encased in a dust-tight plastic cover, and each switch has isolated single-pole double-throw circuits, 5 amp, 125 or 250 v. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.



For details, circle 63 on Post Card

Reader Service Post Cards for requesting more details on products described are provided on pages 291-292.

NON-MARRING HAMMER has aluminum alloy head

The Trucut No-Mar Hammer is said to transmit a full and accurate blow without rebound, to be non-sparking, non-chipping, non-spalling. According to manufacturer this hick-

For cooling water systems, the latest word is ENDCOR®

ENDCOR – new from Dearborn's research laboratories, gives better corrosion control at lower cost in open recirculating cooling water systems.

ENDCOR – promotes rapid film formation . . . is completely stable against oxidizing agents.

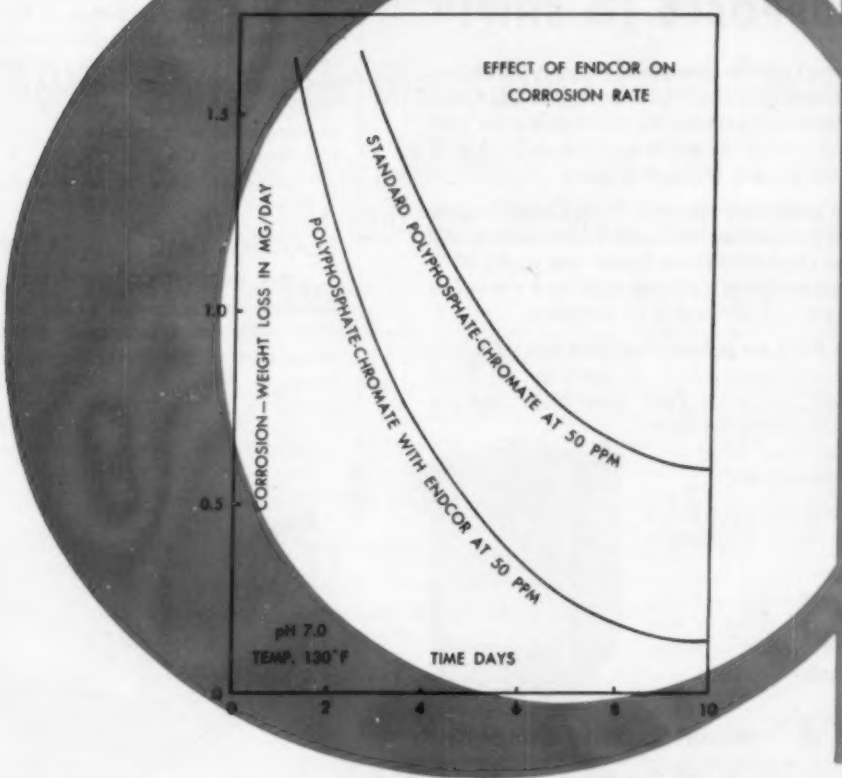
ENDCOR – sharply reduces corrosion rates and deposit formations . . . minimizes sludge adherence to heat exchange surfaces.

ENDCOR – permits operating any open system at higher pH readings . . . saves on acid.

Developed after exhaustive experiments, ENDCOR has been incorporated in Dearborn's Polychrome and non-chromate treatments and successfully tested under severest laboratory and operating conditions in customer plants for over a year. Available now in powder or briquette form. Your Dearborn engineer will be happy to fit these new treatments to the specific needs of your system. Call him today or write for detailed Technical Bulletin.

DEARBORN CHEMICAL COMPANY

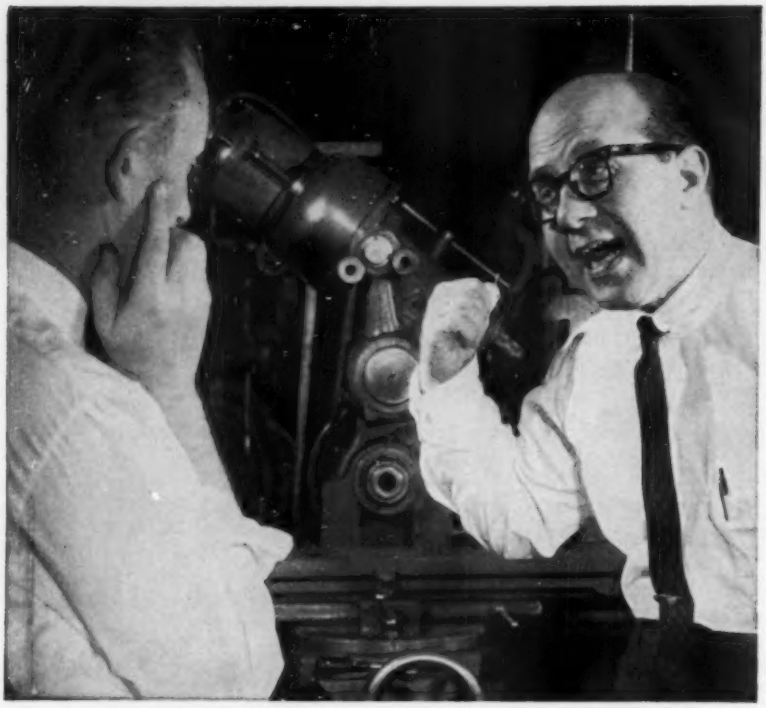
Executive Offices: Merchandise Mart, Chicago 54 • Plants and Laboratories: Chicago Linden, N. J. • Los Angeles • Toronto • Honolulu • Havana • Buenos Aires



pioneer in the science of corrosion control

dearborn

TORIT DUST COLLECTION ENDS THIS:

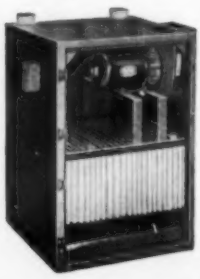


"OUT OF PRODUCTION FOR THREE DAYS? THAT'S WHEN WE'RE SUPPOSED TO SHIP!"

"And believe me, that wasn't all the boss said! Two key machines were so clogged with dirt and grime we had to disassemble and clean them—overnight! Between overtime for the repair crew and our own crew, I managed a partial shipment in three days. And I made up my mind this wasn't going to happen again!

"I'd heard of preventive maintenance with Torit Dust Control equipment—and the Torit representative I called sure opened my eyes! Clean machines hold close tolerances better and up to 80% longer! Torit collectors remove over 99% of dust and air-borne debris, save on both the cost and frequency of servicing.

"I expected there'd be a hitch on prices—but look what I found out: our production breakdown cost nearly as much as the Torit equipment we needed! And just while Torit Dust Collectors are being depreciated we'll make money on them —through maintenance savings, improved production, and reduced down-time!



"The boss actually congratulated me when I showed him the savings Torit preventive maintenance gives us!"

Torit Dust Collectors stop dust build-up before it costs you money. They're available in both high efficiency cyclone and cabinet type units. Why not check into them today—write:

TORIT manufacturing company

Dept. 1820, 1133 Rankin Street, St. Paul 16, Minnesota

For more facts circle 645 on Reply Card

PLANT ENGINEERING EQUIPMENT

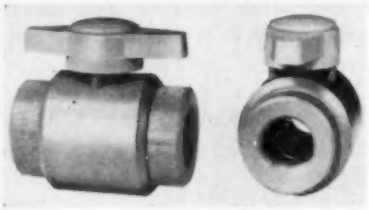
(Begins on page 206)

ory-handled hammer is ruggedly built, yet soft enough not to harm even fine machine surfaces, and it will outlast other types of non-marring hammers. It comes in three sizes weighing from 13 oz to 2 lb, 1 oz. Frank N. Wood Co.

▲ For details, circle 64 on Post Card

BALL VALVES resist acids and chemicals

The solid PVC construction of these ball valves is claimed to resist both external and internal construction, and when in metallic pipelines, prevent galvanic action. Sizes range from ½



through 2 in. in screwed end and socket end (solvent weld) connections for standard plastic or metallic pipe. Seats are available in Teflon or Buna-N. Features quarter-turn operation, two-way flow, negligible pressure drop, and interchangeability of parts. Valves will handle gases, liquids, semisolids at temperatures to 150 F. Hill-McCanna Co.

▲ For details, circle 65 on Post Card

ELAPSED TIME INDICATORS are economically priced

Running time indicators in the Series 5700 will list for around $10.00, manufacturer announces. They have a range of 99,999.9 hr (minutes also available) with a minimum time indication of 0.1 hr. Six display wheels, black numerals on white, show elapsed

Easily-installed PPG Neoprene-coated Duct Liner now meets fire requirements, provides extra margin of safety on ductwork installations.

NOW—PPG Fiber Glass Duct Liner Carries the UL Label

PPG Neoprene-Coated Superfine Duct Liner Meets All Requirements of NBFU Bulletins No. 90-A and 90-B for Ducts

YOUR ASSURANCE OF SAFETY

PPG is proud to announce that its Neoprene-coated Superfine Fiber Glass Duct Liner has been thoroughly tested according to the condition determined by National Board of Fire Underwriters, and has met the Board's rigid safety requirements in compliance with Bulletins No. 90-A and 90-B for ducts. It now bears the label of the Underwriter's Laboratories, Inc.

For you, this means that PPG Neoprene-coated Fiber Glass Duct Liner meets fire requirements and provides that extra margin of safety on any ductwork installation.

PLUS ALL THOSE EXTRA PPG ADVANTAGES...

. . . such as lightweight, easy handling, easy cutting and piecing, low wastage, fast installation, fine acoustical qualities, good thermal barrier characteristics, low resistance to air flow, no air erosion; and lifetime service, because it won't rot or decay, is not affected by humidity or dryness.

Give PPG Fiber Glass Duct Liner a try. It offers you a combination of top-flight insulation and economy. For full information, call your nearest PPG Fiber Glass Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

Sales Offices: Atlanta, Attleboro, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Fort Wayne, Houston, Kansas City, Louisville, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis and Washington.

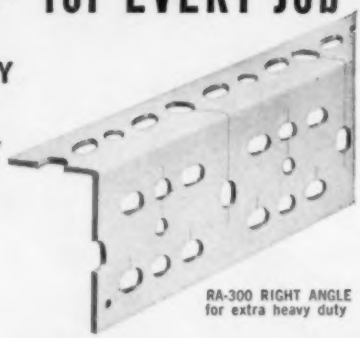
FIBER PPG GLASS PITTSBURGH PLATE GLASS COMPANY

For more facts circle 646 on Reply Card

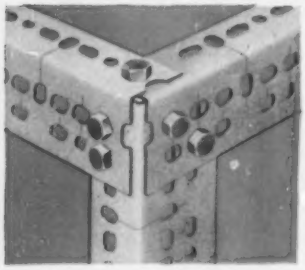
Steel City SLOTTED ANGLE

The RIGHT ANGLE* for EVERY Job

- **EASE OF ASSEMBLY**
  Only a wrench is needed
- **GREATER RIGIDITY**
- **SUPERIOR FINISH**
  Extra thick galvanized



RA-300 RIGHT ANGLE for extra heavy duty



RIGHT ANGLE method of forming a corner assures both ease of assembly and rigidity. A wrench is only tool needed for erection.

3 SIZES

Steel City's RIGHT ANGLE* is fabricated in three sizes for maximum economy and utility . . . all sizes interchangeable within the same structure. The exclusive slot-and-hole pattern, recurring every 3", provides the erector with a rigid method of securing joints. RIGHT ANGLE is structural quality steel, electrogalvanized *after* processing, for complete protection.

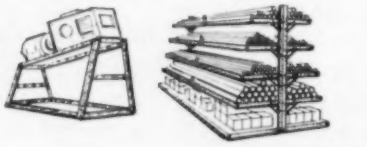
*trade name

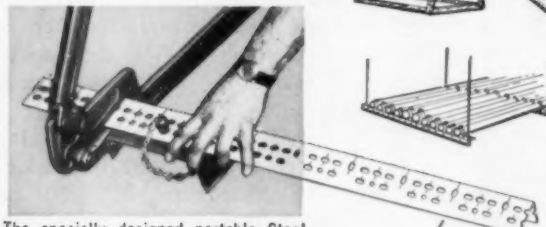
PACKAGED FOR "ONE-MAN CARRY"

Catalog Number	Length	Package	Package Weight
RA-150	6′	10	35
RA-225-10	10′	5	48
RA-225-12	12′	5	56
RA-300-10	10′	5	72
RA-300-12	12′	5	84

PLANGINEERING with Slotted Angle

A touch of imagination and the RIGHT ANGLE method of structural framing permits the building of almost any conceivable structure. Simply PLAN . . . LAYOUT . . . CUT . . . and ASSEMBLE your IDEAS.





The specially designed portable Steel City Cutter cuts all three sizes of RIGHT ANGLE cleanly with one easy stroke.

Measure and cut marks every ¾"

Sold through wholesale distribution only!

Write for bulletin RA-1 or see our catalog in Sweet's files

STEEL CITY ELECTRIC COMPANY

A Subsidiary of American-Marietta Company

PITTSBURGH 33, PA.

For more facts circle 647 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

time. Rated 115 v, 60 cycles; 230 v, 50 cycles; 230 v, 60 cycles; or 24 v, 60 cycles, these units are said to provide rigid control because they cannot be reset and operate only when motor is energized. They are 2-13/16 in. wide, 3⅞ in. deep, can be surface or flush, top or bottom mounted. For maintenance and other applications, Series 5700 Indicators can be used in connection with computers, ovens, driers, recording instruments, grinders, heaters, other machines. Automatic Timing & Controls, Inc.

▲ For details, circle 66 on Post Card

SEMI-CURED TAPE can be cured without pressure

Semi-cured, permafil-treated glass cloth that can be cured without pressure is announced for economical machine-tapping of coils. Chief advantages of development, according to manufacturer, are that it doesn't require an

interliner and will eliminate conventional "dip and bake" process of curing tapes. Only one baking of from 30 min to 1 hr is required, using normal oven temperatures. Rated for Class B operation, tape is available in thicknesses of from 0.005 to 0.011 in. Designed for use on motor armature or field coils, this tape can be used to tie down field coils and band armatures, and in manufacture of laminates and molded forms. General Electric Co.

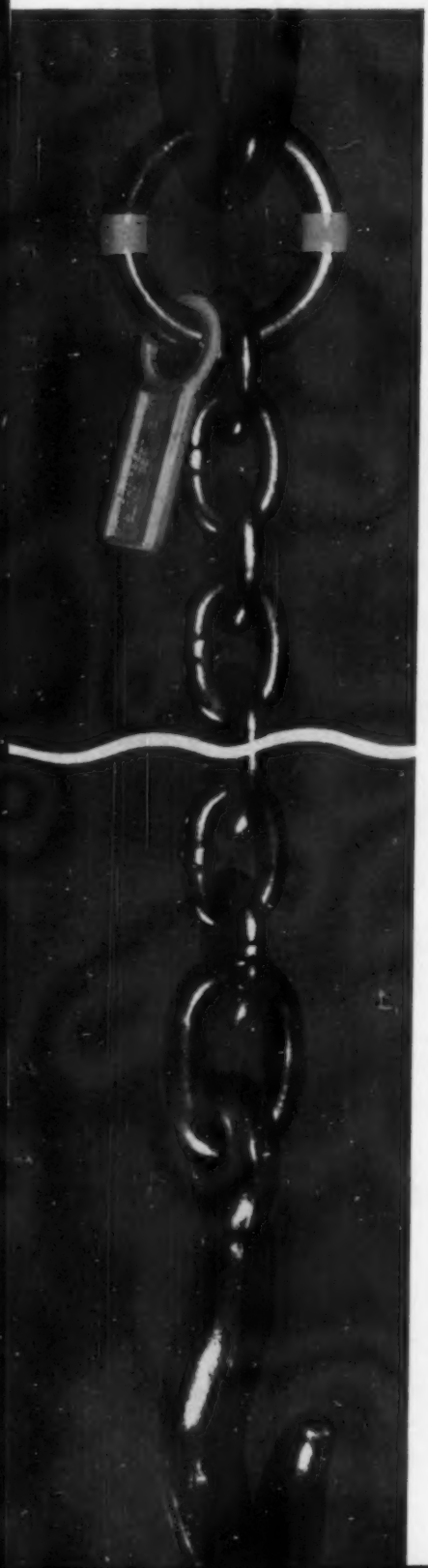
▲ For details, circle 67 on Post Card

LUBRICANT eases working of stainless, tough metals

Anchorlube is claimed to ease extreme stresses to which tools and work are subjected in stamping and machining operations on hard-to-work

New and Revolutionary...

SLING CHAINS THAT TALK



The WARNING RING on Campbell SENTRY SLINGS* tells you immediately when the sling has been overloaded . . . it elongates visibly . . . and before the chain itself is damaged.

Your eye can see the difference!

Ring remains round
Sling used properly

Ring distorted
Sling overloaded

New, revolutionary . . . Campbell **SENTRY SLINGS**—fully tested for over a year by foundries, steel fabricators and heavy equipment manufacturers, offer many important advantages. The **WARNING RING** is stronger than the chain itself. Yet it changes shape as the sling is overloaded . . . *before permanent damage occurs.* Repair is quick and easy, with a new **WARNING RING** replaced at the factory. Re-tested and re-certified Sentry Slings are again ready for regular service.

Here's How You Benefit From New SENTRY SLINGS:

- Safety programs are easier to maintain—with the **WARNING RING**'S built-in safety that protects men and material!
- Lower repair costs give larger savings than ever—normally only the **WARNING RING** will need repair!
- Immediate visual evidence of overload means easier inspection—even while sling is in use!

SENTRY SLINGS, available in all types, are made from Cam-Alloy steel chain only and are available at no extra cost! All slings carry the Campbell Guarantee and Certificate of Test.

CAMPBELL with the WARNING RING SENTRY SLING

CAMPBELL CHAIN *Company*

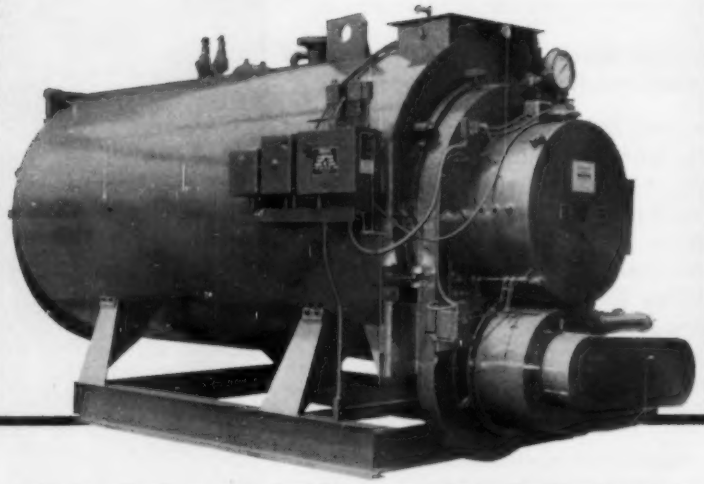
FACTORIES: York, Pa.; West Burlington, Iowa; Union City, Calif. WAREHOUSES: East Cambridge, Mass.; Atlanta, Ga.; Dallas, Texas; Chicago, Ill.; Portland, Ore.; Seattle, Wash.; Los Angeles, Calif.

*Patent Applied For

For more facts circle 648 on Reply Card

Continental AUTOMATIC BOILERS

2-PASS DESIGN...



WHY THIS 2-PASS AUTOMATIC BOILER CAN GIVE YOU LOWER OPERATING AND MAINTENANCE COSTS...

In the simplified, compact design of Continental 2-Pass Automatic Boilers, you get the most practical and economical approach to heat transfer available in packaged boilers today.

HERE'S JUST ONE IMPORTANT DIFFERENCE:

Continental's 2-Pass design eliminates the need for refractory baffles and brickwork. There is *no* danger of hot gases short-circuiting direct to the stack. You eliminate costly maintenance problems and your boiler operates with low stack temperature always.

The cost-saving performance of these compact boilers is today recognized by industrial concerns and institutions of all types. All the facts on the Continental are presented concisely in a new bulletin that's yours for the asking. Write today for Bulletin BE-400.

- 15 to 600 HP Steam Boilers—to 250 PSI
- Hot Water and HTW Boilers
- Oil, Gas, Combination Oil/Gas

CONTINENTAL BOILER DIVISION
BOILER ENGINEERING & SUPPLY COMPANY, INC.
Phoenixville, Pennsylvania
For more facts circle 649 on Reply Card

PLANT ENGINEERING EQUIPMENT

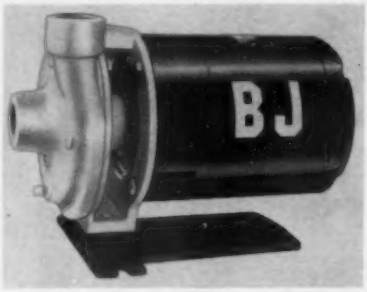
(Begins on page 206)

metals—stainless steel, high carbon, high chrome, cast iron, Monel etc. Applications include drilling, tapping, spot facing, counter-boring, milling, seat forming, drawing, piercing, punching etc. Anchorlube is considered a clean lubricant, manufacturer says, since it contains no oil and creates no difficult cleaning problems. It is also claimed odor-free, harmless to the skin, and non-rusting to metals on which it is used. It can be swabbed, sprayed, rolled or brushed on, and may be diluted with water. A free sample is offered to qualified plant engineers. Anchor Chemical Co.

A For details, circle 68 on Post Card

CLOSE-COUPLED PUMP for general purpose use

The compact Type LX Bilton pumps offer capacities to 270 gpm, heads to 150 ft. Motor ratings are from 1/3 to 7½ hp, single-or three-phase, two- or four-pole speeds. This pump has



simplified mounting bracket that supports both pump and motor—no need for base plates or rigid foundations. The unit can be mounted vertically, horizontally or at any desired angle. Pump and motor are close-coupled with a common stainless steel shaft. A mechanical seal is standard equipment. Byron Jackson Pumps, Inc.

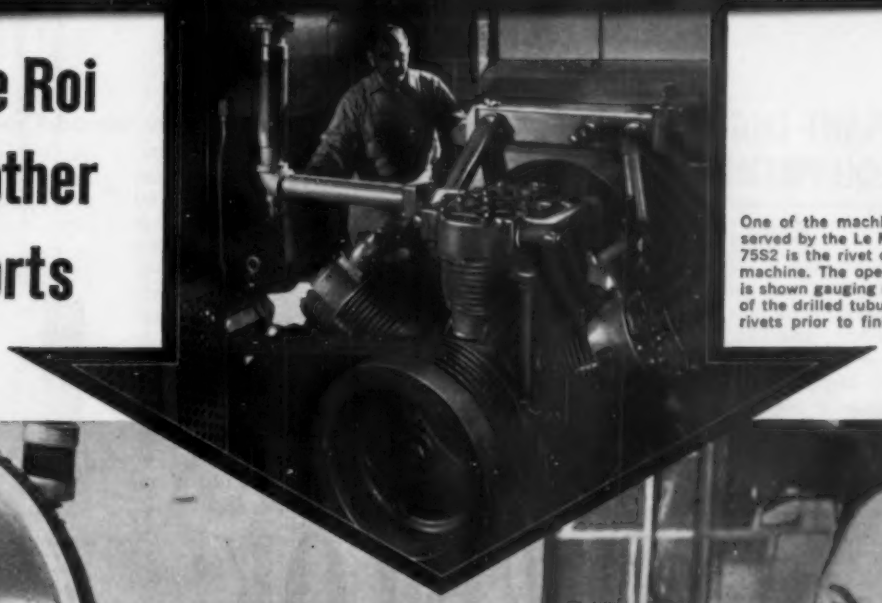
A For details, circle 69 on Post Card

CONTROL VALVE for fine metering of liquids, gases

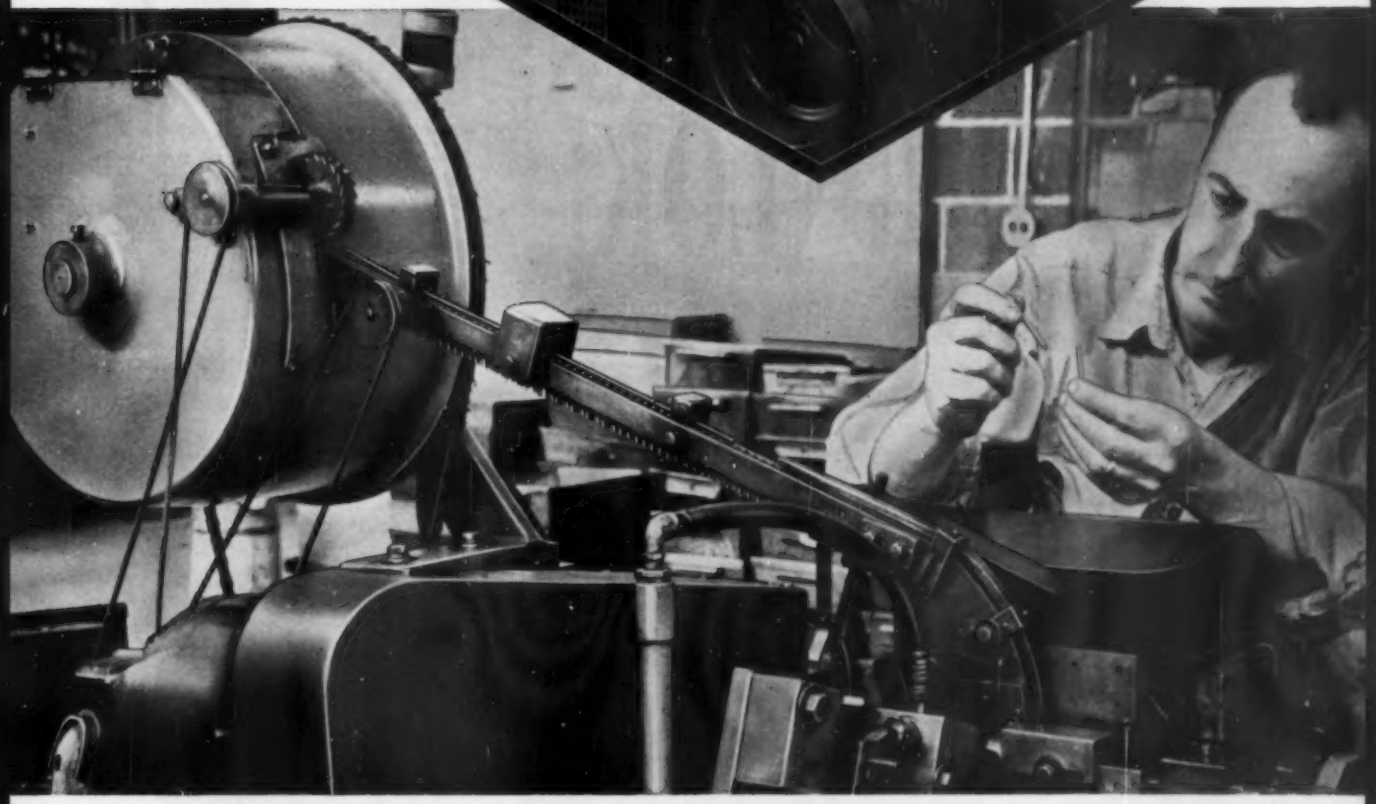
With the Micro-Flow Valve a flow coefficient as low as 0.003 to zero can be controlled linearly over a stem travel of 5/8 in., according to manufacturer. Higher ranges are also standard. At 5000 psi the Micro-Flow Valve can be throttled from 3 ccpm, to 5 gpm, it is stated; at lower pressures the valve has been used to deliver as little as 10 drops per hour. Pressure

For more facts circle 648 on Reply Card

One good Le Roi leads to another ...user reports



One of the machines served by the Le Roi 75S2 is the rivet drilling machine. The operator is shown gauging one of the drilled tubular rivets prior to finishing.



LE ROI 75-HP STATIONARY COMPRESSOR

First air-cooled Le Roi finishes 5 years of service with just routine cleaning and oil changes!

Shown above is a Le Roi 75S2 compressor recently installed at John Hassall, Inc., Westbury, Long Island, manufacturer of job-designed fasteners and parts.

Picking Le Roi came naturally when Hassall found need for additional air power. Their last Le Roi has worked for five years without trouble, and has required only filter cleaning and oil changes for upkeep.

Hassall was convinced they could save 30% on installation, get more air from less space, and reduce maintenance time about 40% if they installed the air-cooled Le Roi 75S2 rather than a water-cooled air compressor.

Moreover, Le Roi compactness permits installation *near the point of use*, with less piping and air loss. Air-cooling eliminates costly plumbing and water-line freeze-ups... permits indoor or outdoor installation. Dual control gives you constant speed or automatic start-stop operation.

Pick Westinghouse unit-type or Le Roi stationary air compressors for your needs. Sizes from ½ to 100 hp. See your Le Roi distributor, or write to Le Roi Division, Westinghouse Air Brake Co., Sidney, Ohio.

SC-97

LE ROI STATIONARY COMPRESSORS

PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

For more facts circle 650 on Reply Card

PLANT ENGINEERING EQUIPMENT

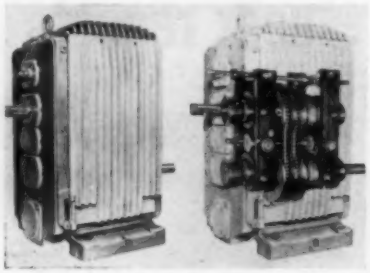
(Begins on page 206)

ratings are to 10,000 psi. Clog and vibration resistance are obtained by restricting all flow to a triangle-shaped orifice. Standard materials are carbon steel, stainless steel or bronze. Air-diaphragm actuated units are available for 3 to 15 psi air supply. Prices start around $43.00. The General-American Valve Co.

▲ For details, circle 70 on Post Card

VARIABLE-SPEED DRIVES are compact for their high ratings

The RS-33 P. I. V. is a constant-horsepower variable-speed drive designed to meet capacities to 50 hp and ratios to 5.5:1. These drives are described as extremely compact for their high horepower ratings. Drives of 3.8:1 and less can be directly coupled to a 1750 rpm motor. They come in five types: basic drive, basic drive with output gears, basic drive with input and output gears, basic drive with integral foot-type motor and basic drive with integral foot-type motor and output gears. The drives consist of twin strands of single roll chain operating between a pair of facing wheels having a floating center disc. Effective diameters of the wheel faces are altered

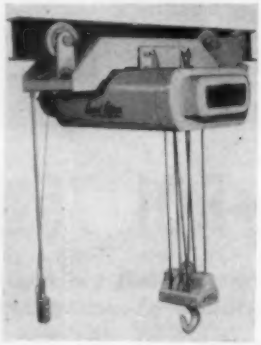


during operation, changing the ratio and output shaft speed. In this way they provide stepless adjustment between maximum and minimum settings on heavy machine tools, timing, mixing, conveying systems etc. Folder 2874 describes them. Link-Bolt Co.

▲ For details, circle 71 on Post Card

CABLE-TYPE HOISTS for the low headroom spots

Hi-Hook models in the Series 700 line of Load Lifter Cable-Type Electric Hoists are low headroom type in capacities from 2 through 6 tons; single- and two-speed lifting speeds; push type, hand geared, and motor driven trolley suspensions; various lifts and speeds; for standard three-phase currents. For heavy duty industrial service, these hoists have close



headroom dimensions for hoisting applications where available headroom, distance from bottom of monorail or bridge beam to highest point of hook travel, is of prime consideration.

Headroom advantages are gained through design of trolley suspensions, reeving of rope and compact lower block. The hoist frame mounts close to the bottom of the monorail or bridge beam, providing a headroom dimension smaller than generally found. These models also offer true vertical lift arrangement provided by use of a right-and left-hand grooved

P&S TURNLOK

Built to Take It

P&S TURNLOK wiring devices are designed to give trouble-free service no matter how tough the going gets. TURN-LOK devices are available in 10 and 20 Amperes, 2-, 3-, and 4-wire types: receptacles, connectors and caps.

All P&S TURNLOK devices have extra large head binding screws and ample wireways for quick, easy wiring. Armored sections are anchored securely. Cap blades are positioned accurately. Contacts are anchored securely. Fastening screws in connectors are secured in body . . . cannot fall out in wiring. Ratings are plainly visible.

For information about P&S TURN-LOK Line, write Dept. PE-96.

PERFORMANCE SPECIFIED

PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill. In Canada: Renfrew Electric Co., Ltd., Toronto, Ontario

For more facts circle 651 on Reply Card

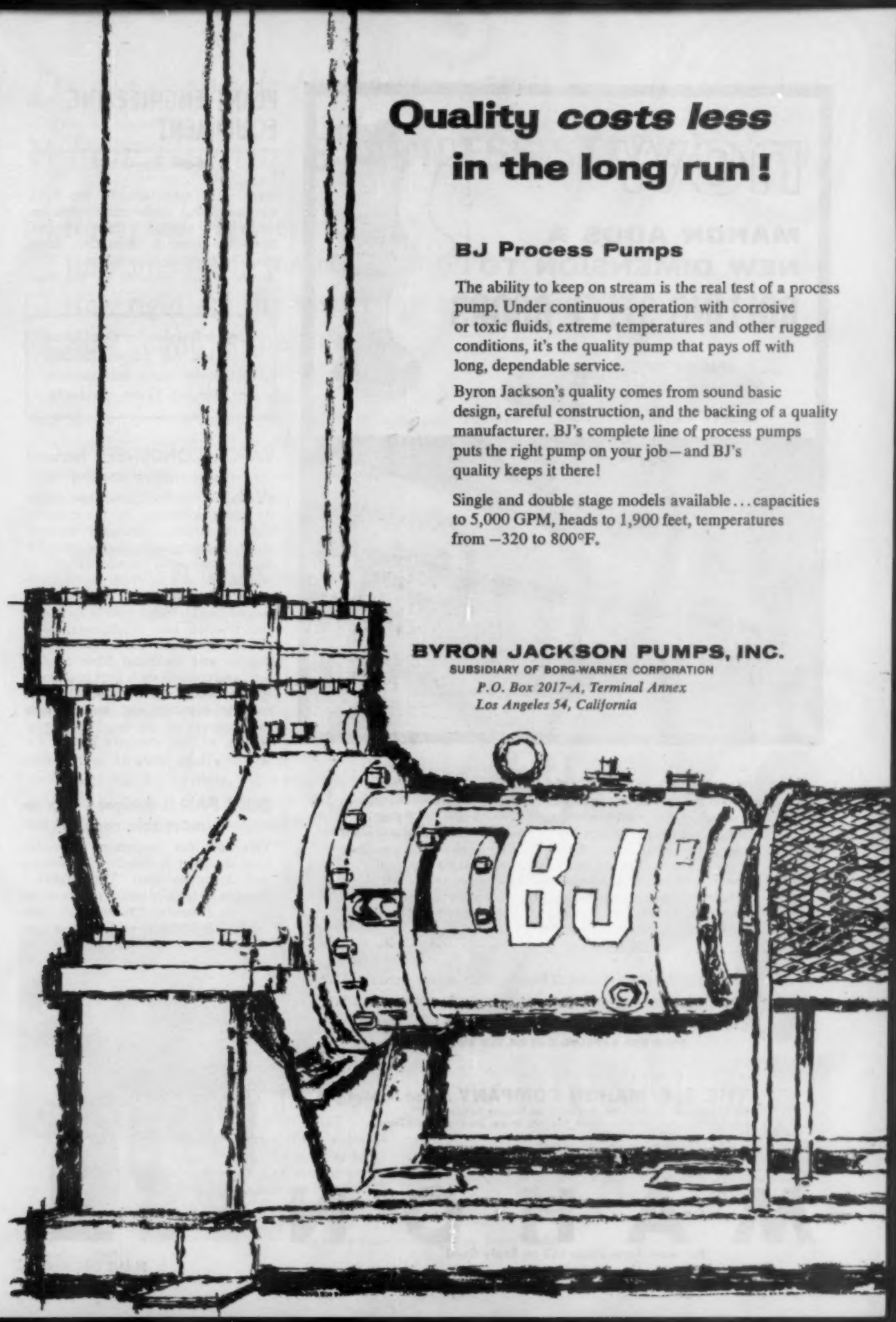
Quality *costs less* in the long run!

BJ Process Pumps

The ability to keep on stream is the real test of a process pump. Under continuous operation with corrosive or toxic fluids, extreme temperatures and other rugged conditions, it's the quality pump that pays off with long, dependable service.

Byron Jackson's quality comes from sound basic design, careful construction, and the backing of a quality manufacturer. BJ's complete line of process pumps puts the right pump on your job—and BJ's quality keeps it there!

Single and double stage models available... capacities to 5,000 GPM, heads to 1,900 feet, temperatures from −320 to 800°F.

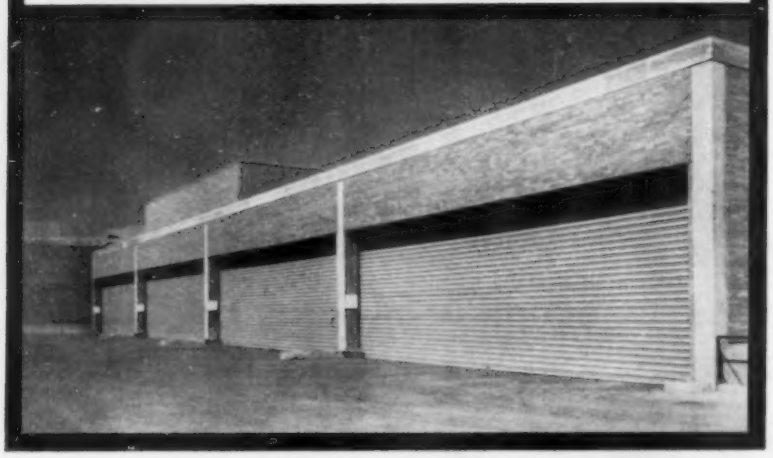


BYRON JACKSON PUMPS, INC.
SUBSIDIARY OF BORG-WARNER CORPORATION
P.O. Box 2017-A, Terminal Annex
Los Angeles 54, California

now

MAHON ADDS A NEW DIMENSION TO ROLLING STEEL DOORS

...7-INCH WIDE SLATS FOR HEAVY-DUTY USE



Newest addition to the family of Rolling Doors from Mahon is a curtain design that fills a real need in many door applications. It uses 7-inch-wide interlocking slats of heavy (16- or 14-gage) Bonderized steel to provide *extra-long life in hard and constant usage.* These new Mahon Rolling Steel Doors have been proven-in-use to be economically and functionally ideal for industrial plants, railroad, truck and maritime warehouses and similar installations, particularly involving extra-wide door openings. Shown: Four of the new Mahon Doors—these are 48′ 5″ x 15′ 6″ sizes. Write for information.

MAHON BUILDS A COMPLETE LINE OF ROLLING DOORS IN GALVANIZED OR STAINLESS STEEL, ALUMINUM OR BRONZE—MANUALLY, MECHANICALLY OR POWER-OPERATED MODELS IN STANDARD, UNDERWRITERS' LABELED, OR SPECIAL TYPES.

SEND FOR CATALOG G-60 OR SEE SWEET'S FILES.

THE R. C. MAHON COMPANY *Detroit 34, Michigan*

MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, San Francisco and Torrance.
Representatives in all principal cities.

MAHON

For more facts circle 653 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

drum, says manufacturer; the hook travels without lateral movement, between upper and lower limits of travel. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

▲ For a copy, circle 72 on Post Card

Use the Reader Service Cards provided on pages 291-292 to ask for more information on any of these products.

VAPOR CONDENSER features evaporative cooling

Cooling is achieved in this high capacity vapor condenser by the evaporation of moisture on tube surfaces through which vapor passes. According to company, capacities of 30 million Btu are available from single units. Heat given off from vapor as it is condensed is transferred to air stream and rejected into atmosphere. Non-condensables are sub-cooled several degrees and separated from condensate, and condensate is kept in a closed system under high vacuum. Dampers regulate capacity and automatically vary amount of air handled in proportion to load. Niagara Blower Co.

▲ For a copy, circle 73 on Post Card

DUCT FAN is designed with removeable cone

This duct fan features a removable cone designed to reduce maintenance and downtime costs. This makes it possible to remove motor or fan wheel without removing "Bifurcator" from duct. The design is said to be especially advantageous for plants using duct fans to exhaust air containing

Do you check these points When Buying **STAINLESS STEEL** *Valves?*

- ☐ **How good are the castings?**
- ☐ **How precise is the machining?**
- ☐ **How rigid are the inspection and testing?**
- ☐ **How sound is the design?**

Just as important as a suitable stainless steel alloy are these four checks on valve quality. For long, dependable performance, a valve should rate *perfect* on every one.

There's a very good reason why you can be sure Jenkins Stainless Steel Valves will do that, unvaryingly:

For almost a century Jenkins has specialized in making valves. And making them to one standard of quality . . . the highest. Every operation and every worker is aimed at fulfilling that standard. The result is a product that can be backed by this 91-year-old assurance for valve users:

A Fair Offer

If you will put a Jenkins Valve, recommended for your particular service, on the worst place you can find . . . where you cannot keep other valves tight — and if it is not perfectly tight or it does not hold steam, oil, acids, water or other fluids longer than any other valve, you may return it and your money will be refunded.

Order these reliable Jenkins Valves from your local Jenkins Distributor. Ask him or write us for Stainless Steel Catalog No. 59SS. Jenkins Bros., 100 Park Avenue, New York 17.

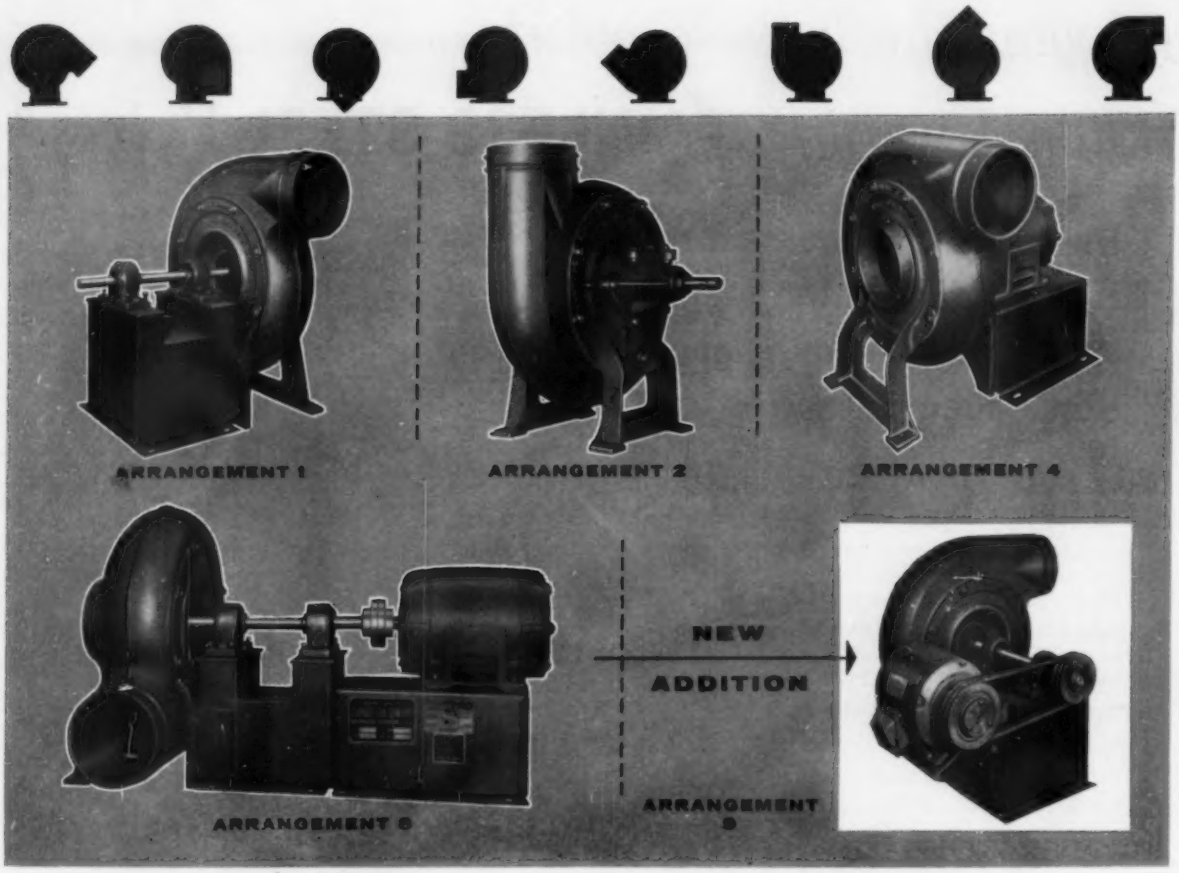
JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

JENKINS SINCE 1864 Jenkins Bros

Sold Through Leading Distributors Everywhere

For more facts circle 654 on Reply Card



Presenting... *the new line of CLARAGE Type CI Exhausters*

Volumes to 3800 CFM, pressures to 18″, temperatures to 750°F., six sizes, three wheel types, five arrangements as shown above, adjustable to any of the eight standard air discharge directions.

Result: fan equipment uniquely well suited to nearly every service imaginable. The uncomplicated, heavy construction, featuring cast iron housings and sideplates, makes the Type CI the natural selection for such severe applications as exhausting from grinding, woodworking, and other machines . . . conveying materials ranging from fibers to grains . . . removing smoke and fumes . . . furnishing industrial process air . . . handling chemical and hot gases.

Write for new Catalog 707 containing performance tables, dimensions, and system data. Get acquainted with the advantages you'll enjoy by choosing Clarage Type CI Fans for your next requirements. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

Dependable equipment for making air your servant

CLARAGE FAN COMPANY

Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 655 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

abrasives, chemicals or other materials which cause excessive wear on fan blades. DeBothezat Fans Div., American Machine and Metals, Inc.

For details, circle 74 on Post Card

LITTLE STARTER does many jobs more economically

Compact in size (5-¾ in. wide, 7 in high and 4-3/16 in. deep) this company's low priced Size 00 Starter is a magnetic, non-reversing type claimed to satisfy about 40 per cent of all general purpose applications up to 2

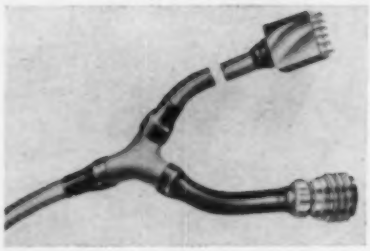
hp—better and more economically than larger starters. For use with both polyphase and single-phase motors, it is available as open type or in a NEMA Type 1 enclosure. Cover control offered consists of "reset" only; "start, stop-reset," and "three-position selector switch." Kits are available for field converting the "reset" only starters to the other types. Company also offers the choice of two-or three-coil adjustable relays. Hammer, Inc.

For details, circle 75 on Post Card

MARKING KIT for identifying the pipe lines

Step-by-step instructions for setting up a complete, uniform marking system for pipes of all sizes are provided in this pipe marker kit. It tells which pipes must be marked for maximum safety, and where markings should be located, and its lists ASA requirements calling for legend-plus-color identification. Kit contains a 6-pp planning guide, samples of markers for testing under actual conditions. It is free to qualified plant engineers. W. H. Brady Co.

For details, circle 76 on Post Card



FLEXIBLE TUBING shrinks to form bond when heated

Hyshrink is a polyolefin tubing and sleeving material which heat shrinks in diameter to form a tight, mechanical bond, even over irregular shapes. Flame retardant and thermally stable, it can be slipped over terminals, connectors, wire and cable. Upon application of heat (275 F) the tubing shrinks in diameter. Heating does not affect the tubing's flexibility, it is stated, and longitudinal shrinkage is less than 10 per cent. Hyshrink is described as an excellent insulating material with high dielectric and mechanical strength and tested resistance to most chemicals. It is also said to resist fungus growths, and stay flexible and strong from 67 to 275 F. Because it has been irradiated, the tubing is claimed free of radioactivity and to

LOOK!

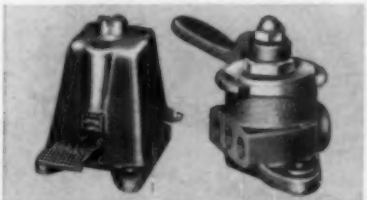
LOGAN HAS IT!

RIGHT PRICE
TOP QUALITY
PEAK PERFORMANCE

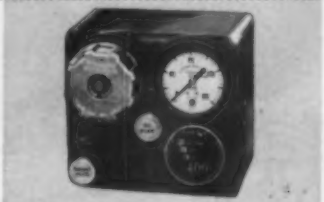
the most complete line of
POWER CHUCKING EQUIPMENT

LOGANSPORT MACHINE CO., INC.
838 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG
☐ 100-1 AIR CYLINDERS
☐ 100-2 MILL-TYPE AIR CYLS.
☐ 100-3 AIR-DRAULIC CYLS.
☐ 100-4 AIR VALVES
☐ 100-5 LOGANSQUARE CYLINDERS
☐ 100-6 ULTRAMATION CYLINDERS
☐ 200-2 PRESSES
☐ FACTS OF LIFE
☐ 200-1 HYD. POWER UNITS
☐ 200-2 ROTOCAST HYD. CYLS.
☐ 200-3 750 SERIES HYD. CYLS.
☐ 200-6 AND 200-7 HYD. VALVES
☐ 200-6 SUPER-MATIC CYLS.
☐ 200-1 CHUCKS
☐ ABC BOOKLET
☐ CIRCUIT RIDER
TO:
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____

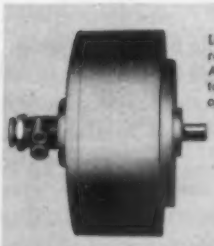


Logan Control Valves—Complete line of actuators available—for manual, semi-automatic or automatic control.



Model 400 RFL Unit Reducing Valve, pressure gauge and lubricator in compact aluminum housing.

Logan Standard Chucks from 6" to 24" diameter; specials to meet your needs.



Logan Double Acting, rotating type cylinders. Air operated sizes 1½" to 20" bore. Hydraulic operated 3" to 14" bore. Hollow or closed center.

FREE SEND FOR YOUR COPY OF LOGAN "CIRCUIT RIDER"
A 32-page manual on fluid power circuits (fifth edition) completely revised to present current engineering trends.

MEMBER: Natl. Mach. Tool Builders' Assn. Natl. Fluid Power Assn.

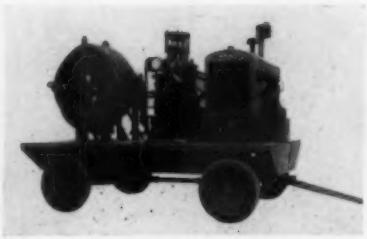
For more facts circle 656 on Reply Card

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

show exceptional resistance to radiation when exposed to radioactive surfaces. Hot airguns, ovens, radiant heat and liquids can be used for heating Hyshrink, it is noted, and no toxic fumes are given off. It comes in five standard colors in sizes from 4 (0.348 in. ID) to 24 (0.050 in. ID) lengths of 4 ft. Anaconda Wire & Cable Co.

▲ For details, circle 77 on Post Card



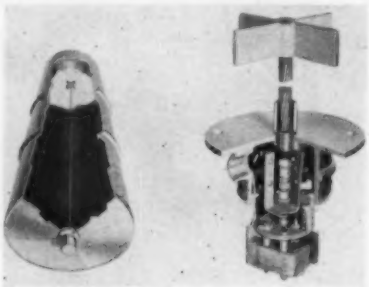
HYDRAULIC CLEANING UNIT uses only water

The Hyjet, for hydraulic cleaning of heat exchanger tube bundles and other cleaning and descaling operations, uses a jet stream of water up to 4000 psig or higher through a high pressure nozzle. A wide range of pressures and capacities is offered to fit requirements and, according to company, no solutions or solvents are necessary. Jet is equipped with a "dead man" safety control that shuts unit off when nozzle is unmanned. Unit can be used for de-coking, slag cleaning, casting de-burring, paint and scale removal. Power Specialty Co.

▲ For details, circle 78 on Post Card

LEVEL INDICATORS provide deep-down control

Flexible Shaft Bin-Vue Indicators are announced as a solution to a problem encountered in the use of large bulk bins for storage—that of materials building up along the sides of the bins—which makes level control unreliable. This indicator, mounted top center, is said to assure control at



any desired level. The indicator's 1/100 hp motor turns a four-blade paddle by means of a torsion spring. Paddle turns continuously as long as no material touches it, company explains, but if material makes contact with the paddle it stops. The motor continues to run, however, expanding the torsion spring until it actuates a limit switch. This switch turns off the motor and other equipment controlled by the Bin-Vue. When the materials fall away from the paddle, the torsion spring reactivates the paddle and unwinds from the limit switch, starting the motor and putting the unit in operation again. Convair of Pittsburgh.

▲ For details, circle 79 on Post Card

CONVEYOR BELT designed to resist failure

BostRon is described as the "belt with the hazard-proof carcass" and offered as a remedy for many operating causes of premature belt failure—moisture, impact, fatigue, abrasion, chemicals. This feature is combined with company's balanced belt construction to assure equalized ply stress, and a protective Dulon cover to pro-

This year is your 25th anniversary. It's twenty-five years since you asked for corrosion prevention. It's twenty-five years since Electro Rust-Proofing designed and installed your first cathodic protection system.

ERP has expanded in those years. Today, ERP's worldwide organization protects pipelines, water towers, clarifiers, docks, ships' ballast tanks, and other submerged and buried metals. We've improved our methods . . . pioneered new equipment . . . brought automation to cathodic protection.

We're working now to give you even greater value, even better service for your cathodic protection dollar. To us, this milestone is not a monument. It's a stepping stone towards a corrosion-free future—with ERP.

To those who don't yet know us—we'll be happy to meet you. Just write to Dept. E54.72.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.

A SUBSIDIARY OF WALLACE & TIERNAN INC.

30 MAIN STREET, BELLEVILLE 9, NEW JERSEY

CABLE ELECTRO NEWARK N. J.

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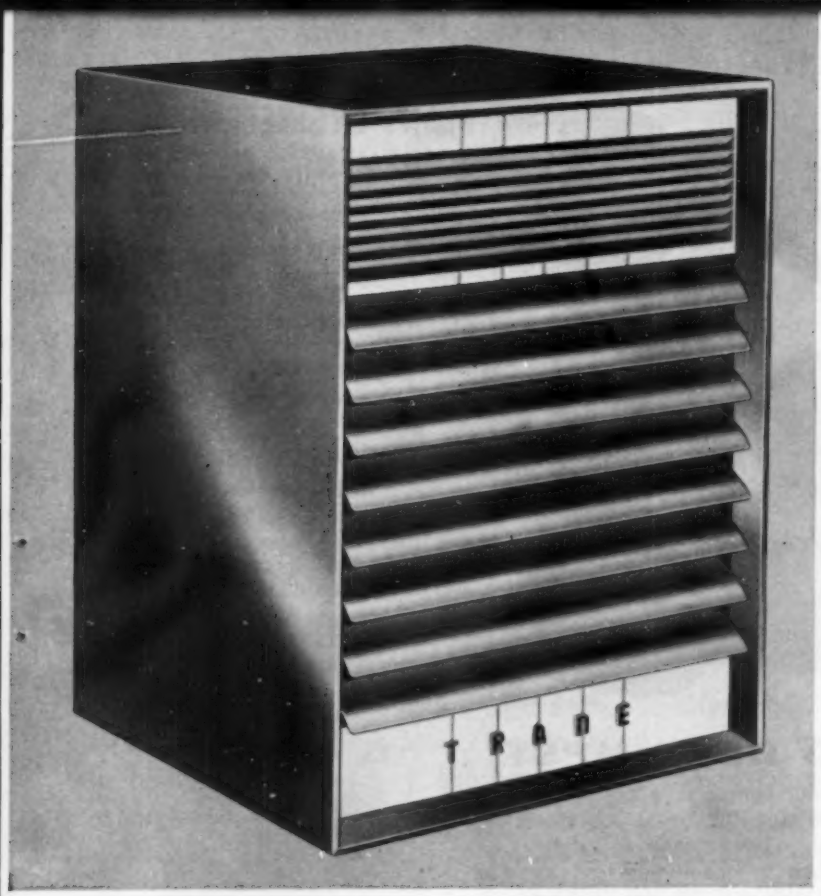
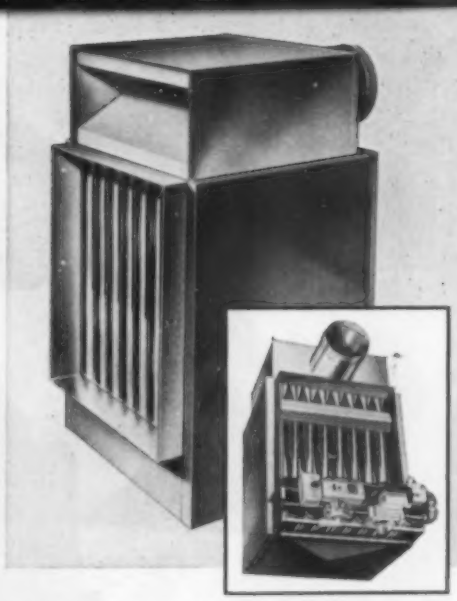




Duct heater is suitable for downstream operation in accordance with latest codes. Provides heating cycle for remote cooling units, such as the TRANE Self-Contained Air Conditioner. Drain pan (shown in inset) is standard equipment. The unit has low static resistance, is of aluminized construction. Operational modulation valve reduces input as much as 80%. 2-stage, 2-input valve available.

Propeller-type heater uses a new, quiet TRANE Fan that is designed exclusively for unit heaters. Access door on bottom of casing makes unit easy to clean. Complete range of sizes from 33,000 to 250,000 Btuh input.

New Trane gas-fired heaters have advanced styling, compact design!

High-performance blower and propeller units—plus duct models approved for downstream operation

Here's a new line of gas-fired heaters from TRANE that combines smart, modern appearance with peak performance and versatility! These TRANE Heaters are ruggedly built for long life—yet they're light in weight, compactly designed for use where space is at a premium.

Three basic types are available: propeller, duct and blower. All models feature an aluminized steel, all-welded heat exchanger that assures long, trouble-free operation. The steel, ribbon-type burners have stainless steel inserts. And the burners are removable individually for service and maintenance.

The TRANE Duct Heater may be used for downstream operation, for use with remote cooling units (such as the TRANE Self-Contained Air Conditioner). All parts of the duct heater that are exposed to the cold air stream are of aluminized construction—including the drain pan, which is standard equipment.

True 2-speed, 2-input propeller units available in 5 sizes. The motor speed and gas input can be automatically cycled to maintain more even temperatures; to provide greater operating economy.

The light weight of these new TRANE Heaters means more Btu's per pound. Freight costs are lower; and installation is simplified: minimizes the need for expensive structural reinforcement.

WANT MORE FACTS on these gas-fired heaters? Just ask your nearby TRANE Sales Office; or write TRANE, La Crosse, Wisconsin.

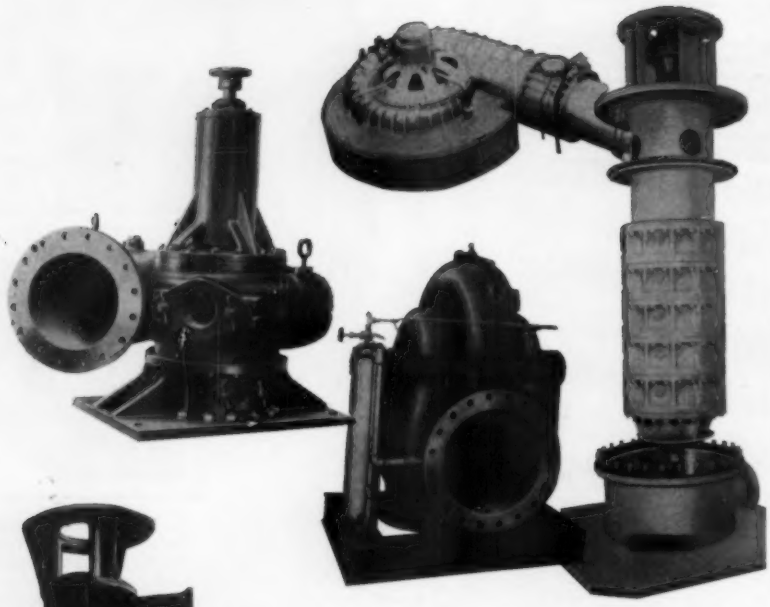
Blower-type heater uses a forward-curved centrifugal fan. Free delivery or duct work installation; adjustable fan belts to provide proper air delivery against varying static pressures. Streamlined fan inlet for exceptionally quiet operation. Louver-Fin Diffusers increase air throw. Sizes from 33,000 to 250,000 Btuh input.

For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY
OF CANADA, LIMITED, TORONTO • 100 U. S. AND 19 CANADIAN OFFICES



SPEAKING OF PUMPS!

Specifying or buying pumps is a big responsibility. You must be sure the pump you select will operate efficiently, economically and dependably "around-the-clock" or in emergencies.

C. H. Wheeler can help you! We make the type pump you need—centrifugal, mixed or axial flow, both horizontal and vertical—in a wide range of capacities and heads.

Also, we can assist you in designing your pump installation, whether it be for municipal or industrial water supply, sewage, drainage, irrigation, flood control, fire protection, heating, air conditioning, or steam power plant services.

We've been designing and manufacturing quality pumps for almost three quarters of a century, so you know when you specify or buy C. H. Wheeler pumps, you can depend on them. Consult your local representative or write for more information.

C. H. WHEELER MFG. CO.

19th and Lehigh Avenue, Philadelphia 32, Pa.

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Components

For more facts circle 659 on Reply Card

You'll find two postage-free Reader Service Cards on pages 291-292. Use them for ordering equipment details—just circle item numbers of equipment you would like to know more about. You may also use the cards for requesting advertised catalogs.

PLANT ENGINEERING EQUIPMENT

(Begins on page 206)

vide maximum resistance to abrasion, cuts, tears and aging. Also claimed for BostRon Belts is extreme flexibility permitting troughing to 45 deg. Boston Woven Hose & Rubber Div., American Biltrite Rubber Co.

▲ For details, circle 80 on Post Card

GUEST GLASSES have shield-like single lens

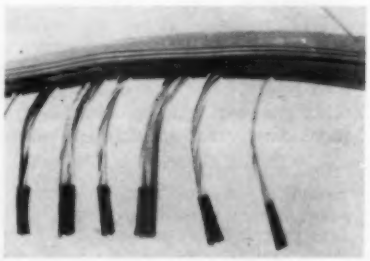
An inexpensive means of eye protection for plant visitors, these lightweight, all-plastic spectacles offer wide area of coverage through a shield-like

single lens which covers both eyes. Lenses are available in either clear or green in a clear crystal frame. Each spectacle is packaged in an individual cellophane envelope. Cost is reported less than ¼ the price of average safety glasses. American Optical Co.

▲ For details, circle 81 on Post Card

TAPERED TUBING for cables of decreasing diameters

Tapered Zippertubing offers a tight fitting jacket for cables of decreasing diameters due to branch-outs. Wires



can be pulled through perforations of this tubing to permit attachment to terminal points. One man can apply it, says manufacturer, and time and labor savings up to 50 per cent are possible. The Zippertubing Co.

▲ For details, circle 82 on Post Card

Super COILIFE*, the new epoxy encapsulation, gives your rewound motors extra operating life . . . and is completely compatible with Guardistor* winding protection. It thoroughly protects against acids, alkalis, moisture, oil, dirt and other contaminants. Super Coilife has proved itself in thousands of applications in mines, chemical plants, petroleum refineries, and other industries. With extraordinarily low viscosity, this encapsulation permeates slots and interstices, thoroughly protecting windings inside and out.

*Trade-Marks

new!! foolproof overtemperature protection for rewound motors

Now, for motors being rewound, Westinghouse offers P.T.C. thermistors—the new Positive Temperature Coefficient semiconductor—to rebuild your conventional motor into a Guardistor motor. Guardistor motors prevent overheating—the major cause of motor failure. This positive protection is available for any make or type of a-c squirrel-cage motor, including multispeed, and for any class of insulation including motors encapsulated with exclusive Super Coilife epoxy.

The heart of the Guardistor motor is the P.T.C. thermistor, one per phase, completely embedded in the motor windings. This inherent protection will provide a warning, will take the motor off the line, or do both. Since the thermistor is temperature sensitive only, it reflects the total winding temperature resulting from all heat sources. It is available for various classes of insulation, at appropriate tripping temperatures, insuring full insulation protection plus full motor capability without nuisance tripping. Westinghouse rewinding with exclusive Guardistor protection is fully guaranteed.

Call your Westinghouse representative for more information on Super Coilife insulation and Guardistor protection on your next motor rewind. You can be sure . . . if it's Westinghouse. J-95218

Westinghouse

For more facts circle 660 on Reply Card

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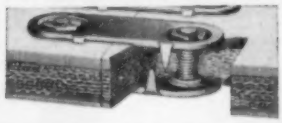
FOR SPLICING, REPAIRING RIPS AND WORN SPOTS



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FLEXCO HINGED 500X & 375 FASTENERS

FOR EXTENSION BELTS IN MINING AND CONSTRUCTION

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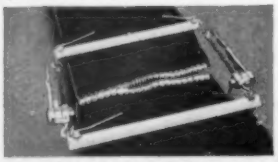
FAR-PUL® BELT CLAMPS

Install your belts the modern way (eliminate wood blocks).



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ALLIGATOR® V-BELT FASTENERS

. . . for low cost, custom-made V-Belts

Sizes for B, C, D, E and BB V-Belts.

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STEEL LACING COMPANY

4616 Lexington St. • Chicago 44, Illinois

For more facts circle 661 on Reply Card

New Plant Construction

(Continued from page 174)

company's research and development laboratories, located here. The expansion program will include a $1.9 million addition to double the size of the main research laboratory and a $300,000 laboratory services building. The new facilities are scheduled for completion early in 1962.

Tulsa, Okla.—Sunray Oil Co., will start construction at once on a new crude oil distillation unit with a capacity of 85,000 bbl per day at its local refinery here. Company is a subsidiary of Sunray Mid-Continental Oil Co., and is a wholly-owned refining and marketing subsidiary.

Pittsburgh, Pa.—Aluminum Co. of America, Alcoa Building, this city, plans an expansion and modernization program at its two major sheet mills at Davenport, Iowa, and Alcoa, Tenn., at a cost in excess of $18 million. The two year construction program will involve about $10 million at the Davenport operation and approximately $8 million at Alcoa.

New Johnsonville, Tenn.—Foote Mineral Co., Philadelphia, Pa., plans to construct a $6-million electrolytic manganese plant on large tract of land here. Work on the plant will begin at once and will have an eventual capacity of 20 million lb annually. It will be built in two stages, with the first unit of 10 million lb capacity expected to be on stream in late 1961 or early 1962.

Beaumont, Texas—Houston Chemical Corp., subsidiary of the Chatham-Reading Chemical Corp., plans to construct two plants here. Plants will cost more than $20 million and will produce tetraethyl lead, tetramethyl lead and ethylene oxide and its derivatives.

Corpus Christi, Texas—Suntide Refining Co., a wholly owned subsidiary of Sunray Mid-Continental Oil Co., plans to construct a styrene plant on large site located here. New facility will produce about 60 million lb annually. Construction of the plant will get under way in the fall. Expenditures, totalling about $10 million over a two year period, also include a benzene extraction unit at the DX Sunray refinery in Tulsa, Okla.

Wallula, Wash.—Boise Cascade Corp., Boise, Idaho, plans an expansion of its pulp-producing operations on the Columbia River, here. Changes in the plant will include new dryer units for the paper machine, installation of equipment in the chemical recovery system and reconstruction of a portion of the paper mill building. Expansion is scheduled for completion by the last quarter of 1961. Cost of the project reported to be about $5 million.

Monile unaffected by dropping milk cans—lactic acid since 1956.

MONILE COPOLYMERIZED FLOORS resist spalling and crumbling under heavy trucking... hard shock... severe vibration... resist destructive acids, alkalies and salts ... resist damage from soaking of oil, grease and water.

Monile gives you time-assured performance... is like new after years of service—under conditions destructive to industrial floors. Monile is applied directly over old or new floors—concrete ...wood...brick...tile. See Sweets Plant Engineering File 4f/Ma or write for 8-page brochure. The Master Mechanics Co., Cleveland 28, Ohio or The Master Mechanics Chemicals Co., (Canada) Ltd., Toronto 14, Ontario.

THE MASTER MECHANICS COMPANY

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For more facts circle 660 on Reply Card

BUY THE LOWEST-COST BATTERY YOU CAN FIND

New 800 amp-hr Model TGS Exide-Ironclad. Same outside dimensions as former 720 amp-hr battery. Other new 22⅝-in. high Exide-Ironclad Batteries in capacities from 400 to 1280 amp-hr.

In the whole world, only the new Exide-Ironclad TG Super gives you so much battery power for so little. Packs 11% more power with no increase in size. That means your present trucks can do more work every shift. And this more powerful battery actually costs you less per amp-hr. Same long Exide-Ironclad life potential for low annual cost. Search all you want. You'll discover, as most others have, that the Exide-Ironclad is truly the lowest-cost battery you can find. Write for our new bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

New Exide battery for small industrial trucks and personnel carriers. Model 3-KCS-9. Features new-design tubular positive plate. Up to 30% more capacity than automobile batteries. Up to four times their average life. Fits same compartment. Write for new bulletin.

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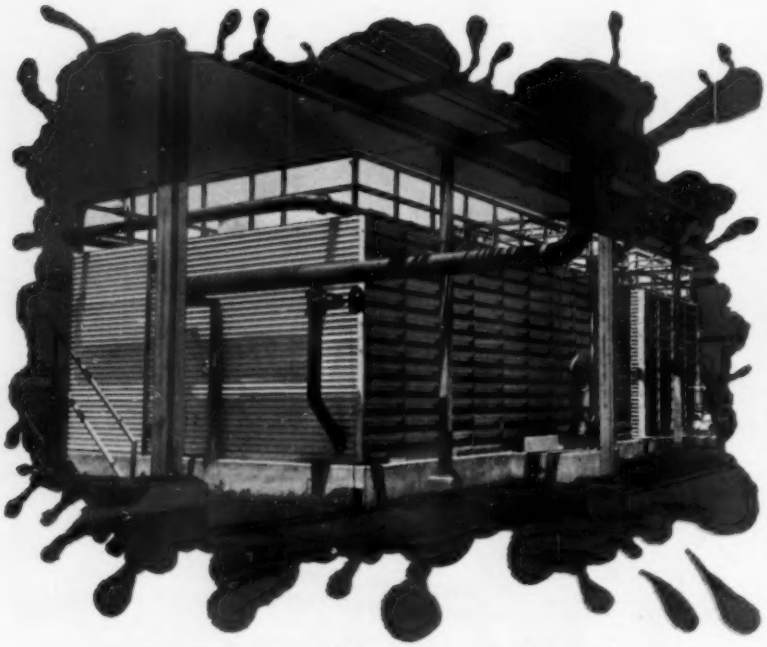


When "hot spots" need cool consideration

Plant Engineers Call the Marley Man

"Our process cooling requirements, though moderate in size, will be critical," said the chief engineer of a chemical processor. "Can Marley offer a cooling tower that is modest in size and cost—yet has all the performance characteristics of a large industrial tower?" Marley *could*—and a Marley Double-Flow Aquatower was installed before the plant went on stream. His process cooling problem was solved . . . until plant production demanded triple the existing cooling capacity. His answer: a two-cell Double-Flow Aquatower beside the original one-cell unit.

Chemical processing has many "hot spots" that can be converted into "profit spots" by Marley cooling towers, but the chemical industry is not unique in this respect. Every manufacturing plant has its "hot spots" — candy slabs, pasteurizers, refrigeration, air conditioning, steam condensing, compressors, welding equipment, molding presses, quenching baths, and many others. All these water-wasters can be eliminated . . . invariably with a sharp rise in plant efficiency. Many plant engineers, alert to the profit potential of water conservation, know that there is a Marley tower that quickly will pay for itself in any service using more than 25 gpm.

Look around *your* plant for "hot spots"—then call your local Marley engineer to show you how to convert them to "profit spots." Or, write direct for information on the Marley cooling tower line that is as broad as industry's demands.

THE MARLEY COMPANY MARLEY KANSAS CITY, MISSOURI

For more facts circle 664 on Reply Card

NEW BOOKS

for the plant engineer

Building and Floor Care

PROFESSIONAL CLEANING AND BUILDING MAINTENANCE by Bill Clark. Size 6¼ by 5⅜ in.; 334 pp; cloth bound. Published by Exposition Press Inc., 386 Park Avenue South, New York 16, N.Y. Price $6.00.

METHODS included in this manual are based on the experience of the author who is a veteran in the maintenance field covering floor and building services. The book is directed to men and women engaged in such activities.

There are three main divisions in the text of this book, namely the field of sanitary maintenance and labor, floor-maintenance technique, and building-care services.

Among the topics treated in the first are the following: outside contractors versus do-it yourself; communications; training; and administration.

In the second section such items discussed are as preliminaries to floor service; merit of cleaners—soaps and detergents; floor finishes and application of finish.

Some topics in the final section are: a complete building-service survey; evaluating building-service labor; and daily work planning.

On Transistors

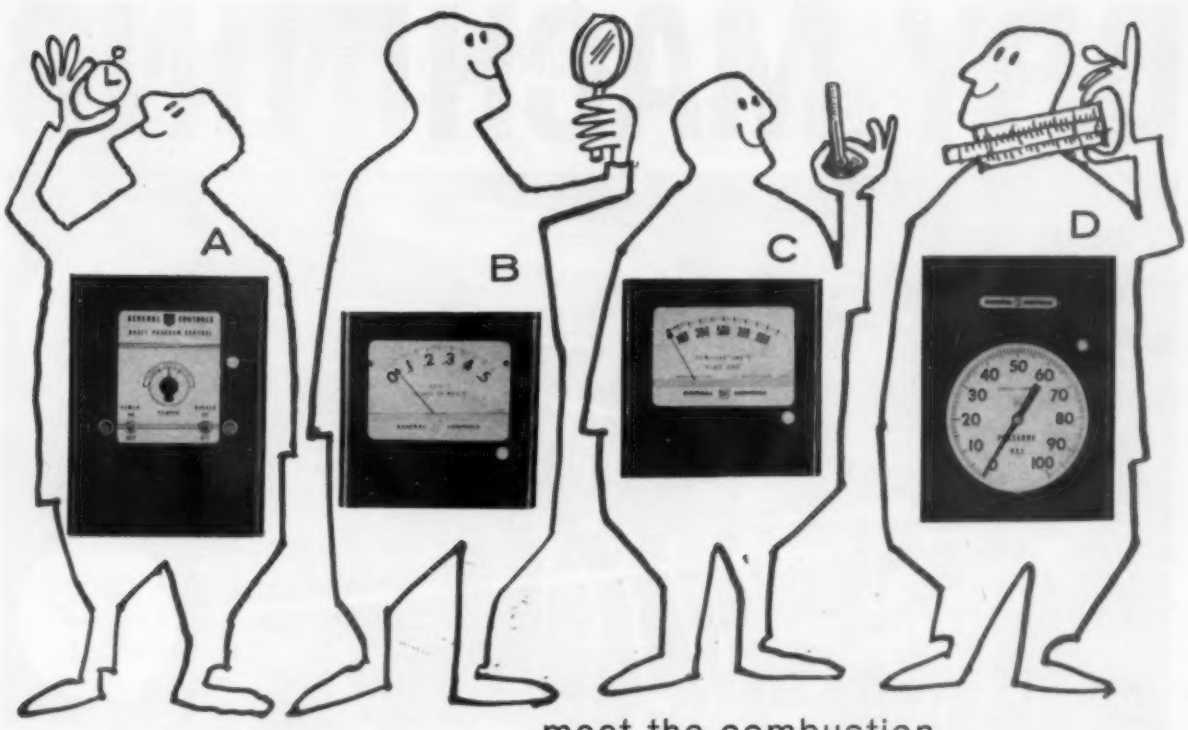
TRANSISTORS IN RADIO, TELEVISION AND ELECTRONICS by Milton S. Kiver. Second edition; size 9¼x6¼ in.; 424 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N.Y. Price $7.95.

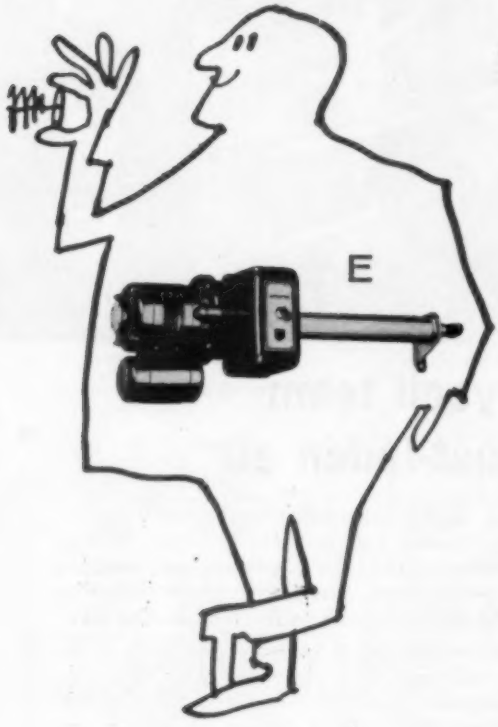
MODERN ELECTRON theory is explained at the beginning of the book in which the author delves into discussion on these fascinating and very useful electronic devices.

This second edition of the book includes new material pertaining to electronic circuits and transistor amplifier design. The text is liberally interspersed with illustrations; for the most part these are circuit diagrams.

In the chapter following the one on electron theory, point-contact and junction transistors are taken into account. In this section such items are explored as electrons and holes, PN junctions, PNP transistors, and point-contact-transistor operation.

A section of transistor characteristics includes the following among the sub-





meet the combustion

EFFICIENCY EXPERTS

from GENERAL CONTROLS

Wondering how to step up your boiler efficiency, cut down on costs? General Controls puts a real damper on fuel waste... with a draft control system that pays for itself again and again.

It's the system that goes in easily, inexpensively—with any type boiler, any type fuel. Saves you as much as 25% on fuel. Saves on manpower, too!

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A **DRAFT PROGRAM CONTROL:** Start-up, shut-down, measures draft changes and sets damper for any firing rate. Optional safety feature shuts down boiler when draft condition is unsafe. Fast, accurate... senses atmospheric changes.

B **DRAFT INDICATOR:** Provides continuous visual readings of draft conditions in combustion chamber and/or stack.

C **FLUE GAS TEMPERATURE INDICATOR:** Shows boiler efficiency by indicating excessive heat loss.

D **STEAM PRESSURE INDICATING CONTROLLER:** Indicates boiler pressure on main instrument panel, and gives accurate on-off or proportioning control.

E **ACTUATOR:** Operates stack damper to maintain constant combustion chamber draft.

Call in the GENERAL CONTROLS MAN in your area today to work out a draft control system for your plant. Or get all the facts by return mail from

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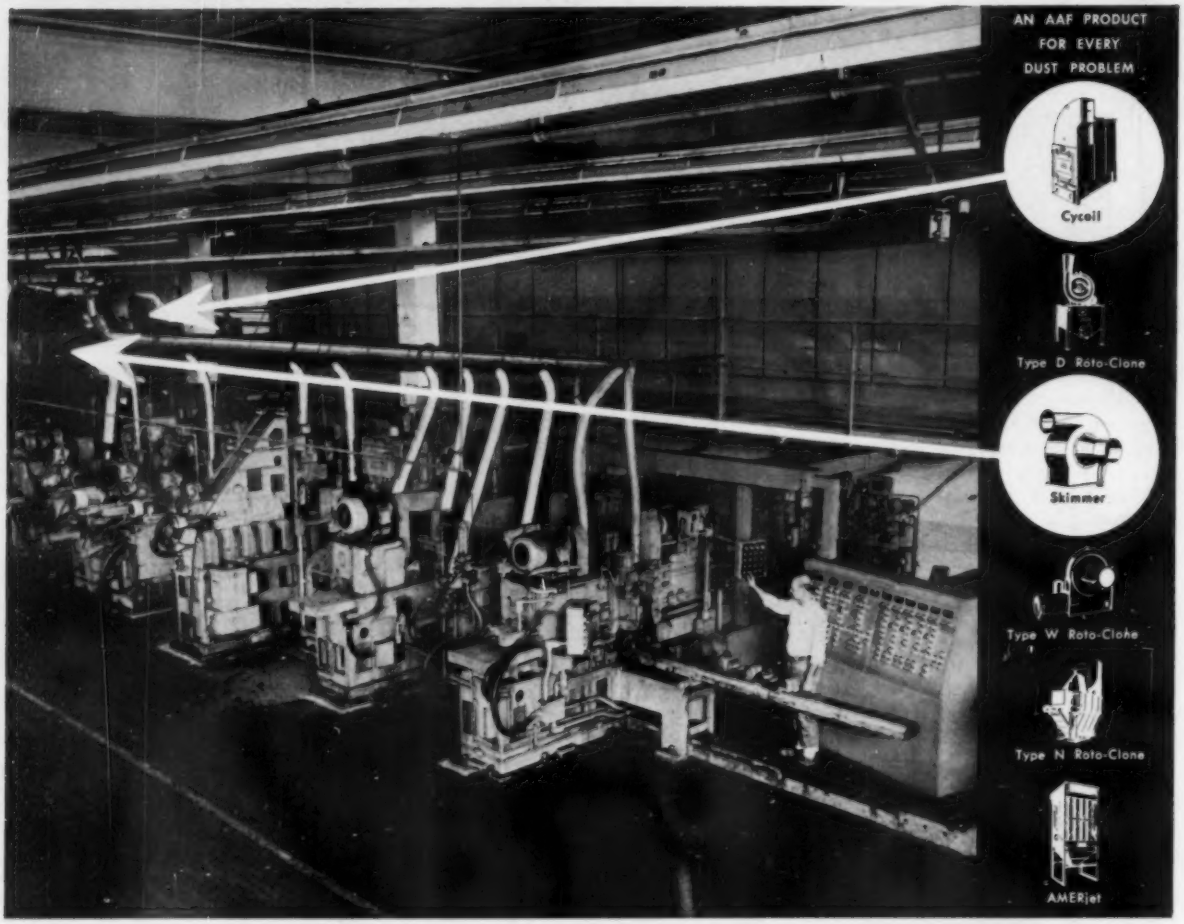
DRY MACHINING



AAF Skimmer-Cycoil team gives new life to dust-laden air

● Motor frames are machined in progressive stages along this automatic transfer machine. Each operation produces dust; each is hooded and its dirty air channeled into an AAF Skimmer pre-cleaner where the bulk of the dust is removed. The partially cleaned air then passes through a high efficiency AAF P-17 Cycoil and is recirculated—*clean*.

AAF's complete line of dust control equipment was application-developed, now challenges *any* metalworking dust problem, regardless of the metal. Where are troublesome dust, fumes or mists causing you trouble—grinding, buffing, polishing, plating, dry machining, wet machining, heat treating, abrasive cleaning? All can be effectively and economically controlled by AAF.

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The Company that cares enough to give you the best!

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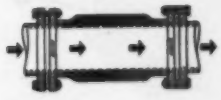
PINCH VALVES

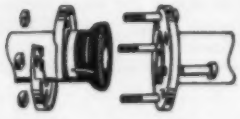
RUBBER, NEOPRENE for Corrosion and Abrasion

- 1" to 14" inside diameter.
- Pressures to 150 psi.
- Temperatures to 200° F.
- Patented "hinged" sleeve. Recesses serve as "hinges" during compression; reduce strain and permit tight closing.

- Cannot leak or stick.
- No working parts in contact with pulp or liquid; no packing glands.



- Unobstructed flow eliminates high friction loss.
- Remote control available.
- Can be equipped for automatic regulation.



- Split flanges and patented Flex Seal ends ensure perfect seal.

See Booth 302, American Mining Congress Las Vegas meeting, October, for latest advancement in valve automation.

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Manufacturing Division

MINE AND SMELTER SUPPLY CO.

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OFFICES AND AGENTS IN PRINCIPAL CITIES
For more facts circle 667 on Reply Card

NEW BOOKS

jects discussed: frequency response, life expectancy, comparison with vacuum tubes, grounded-collector amplifiers, and transistor characteristic curves.

Some of the other chapter topics are: transistor oscillators, transistors in television receivers, servicing transistor circuits, and experiments with transistors.

Radioisotopes for Industry

CUTTING INDUSTRIAL COSTS WITH ISOTOPES. Size 9 by 6 in.; 255 pp including index; second edition; paper bound. Published by Commerce Clearing House, Inc., 4025 West Peterson Ave., Chicago 46, Illinois. Price $5.00.

AT THE BEGINNING of this book brief coverage appears of: the meaning of "radioactive isotope", the source of isotopes, some uses, and how isotopes can be obtained.

Essentially, the publication is an extensive listing of users of isotopes. Company names and addresses are grouped by type of application such as measuring of density, wear, thickness; process tracing; calibration; industrial radiography; basic science research; and irradiation. Preceding each listing category, there are comments pertaining to the applications in the specific field.

A list of radioisotopes available from Oak Ridge National Laboratory appears in the book. The isotopes are identified by name, symbol, and type or types of radiation emitted; their half-lives are also presented. Commercial suppliers are mentioned simply by name and address.

Vacuum Metallurgy

TRANSACTIONS OF THE VACUUM METALLURGY CONFERENCE (1959) edited by R. F. Bunshah. Size 11 by 8½ approx; 212 pp including index; illustrated; paper bound. Published by Associated College Presses, Division of New York University Press, 32 Washington Place, New York 3, N.Y. Price $7.50.

USE OF VACUUM in commercial metallurgical endeavors is meriting a good bit of attention by various groups. Last year the third conference on vacuum metallurgy was held at New York University reflecting some of the experience in this field.

This publication contains a collection of papers from this conference. Among them are those titled as follows: vacuum-arc ingot grain refinement; the skull casting of refractory

WHAT'S BUILDING UP IN

PUMPS AND COMPRESSORS?

Often regarded as the "heart" of a system, pumps and compressors merit frequent re-evaluation to determine that you are using the right machine for a specific application.

Listening to the "heartbeat" of pumps and compressors can best be done at the Power Show, where you can ask questions, investigate and compare, get first hand answers from the manufacturers themselves. There you'll also see a broad line of other power and allied equipment.

At the Power Show you'll be in direct contact with manufacturers, enabling you to get specific, direct, authoritative answers to your questions. Only at the Show will you see more than 250 leading suppliers' products, all conveniently grouped together.

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2448

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NEW YORK COLISEUM

NOV. 28—DEC. 2, 1960

MANAGEMENT: INTERNATIONAL EXPOSITION COMPANY
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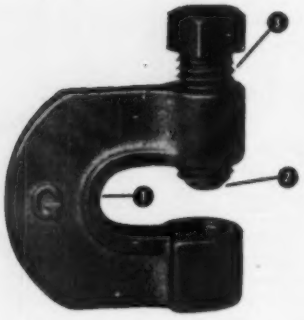
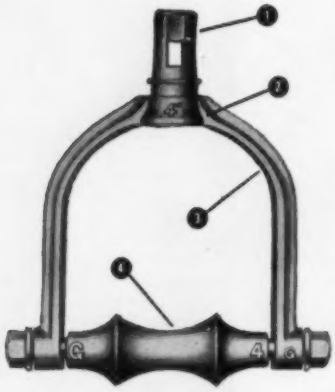
Look at all the extras you get in Grinnell Pipe Hangers . . . yet you pay no more!



GRINNELL C-CLAMP, FIG. 88 — 1 Ribbed, malleable iron casting, for extra strength **2** Hardened steel, cup-point set screw for good "grip" on beam **3** Full thread engagement – casting is drilled and tapped for rod and set screw

GRINNELL EXTENSION SPLIT RING, FIG. 138 — 1 Nipple engaging thick section of malleable iron gives rigidity for support from above, below or from wall **2** Tapped to take screw. No nut to lose **3** Special ring contour holds pipe or tubing firmly



GRINNELL ADJUSTABLE SWIVEL PIPE ROLL, FIG. 174 — 1 Swivel shank permits adjustment without elaborate support **2** Locking device prevents accidental adjustment change; no lock nut required **3** Ribbed design in malleable iron for better strength, lightness, appearance **4** Easy installation; maximum adjustment

GRINNELL CB CONCRETE INSERT, FIG. 282 — 1 One body size accommodates several sizes of rods **2** Slot takes reinforcing rods to assure maximum load rating **3** One-piece body prevents concrete seepage **4** Teeth on insert and nut hold rod firmly in place **5** Homogeneous composition of malleable iron throughout

You get *more* hanger for the money from Grinnell, because Grinnell's huge volume reduces production costs . . . lowers prices right into line with competitive hangers offering less.

Yet you get *so much more* . . . wider choice of types and sizes; better quality control; published ratings for *all* hangers; faster delivery from warehouses nationwide; and more responsible field service by trained Grinnell personnel . . . regardless of how far from the job site the sale was made! Grinnell Company, 277 West Exchange St., Providence 1, R. I. Branch Warehouses in Principal Cities.

Remember, The Best Costs No More — from America's #1 Supplier of Pipe Hangers and Supports

Call your local Grinnell Distributor for pipe hangers, cast and malleable iron fittings, malleable unions, steel nipples – all made by **GRINNELL**

For more facts circle 669 on Reply Card

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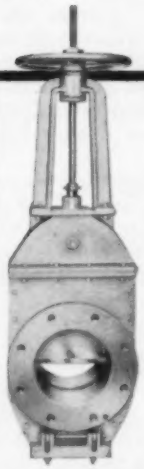
for GASES
SLURRIES OR FREE-
FLOWING SOLIDS
THAT CLOG OR JAM
OTHER VALVES...

Standard Slide Valve, screwed end type or flanged (shown); when fully open, valve offers no restriction to fluid flow. Bulletin 500R.

"Kwikleen" Slide Valve—Not necessary to remove from line for cleaning. Sediment discharged at bottom. Complete cleanout by attaching steam, water or air line to plug hole in valve body. Bulletin 501R.



Heavy Duty "Kwikleen" Valve for line pressures to 50 psi. Blade not exposed when in fully open position. Ideal for pulp stock, slurries, dust, fly ash, scale, granular materials. Bulletin 508.

W. S. ROCKWELL CO.

2920 Eliot St., Fairfield, Conn.

For more facts circle 670 on Reply Card

NEW BOOKS

metals; vacuum-melting equipment for the investment-casting industry; deoxidation of pure iron by vacuum induction melting; experiences with ladle degassing; vacuum melting of beryllium by electron bombardment; vacuum brazing and heat treatment; and the use of vacuum metallurgy and vacuum-cast metals in electron vacuum devices.

Numerous references appear in the book which include an extensive bibliography on the use of electron beam techniques.

The Building Industry

BUILDING, U. S. A., by the editors of Architectural Forum. Size 8¼ by 6¼ in., 147 pp; cloth bound. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. Price $3.95.

NOT DESIGNED as a textbook, or a collection of problem-solving ideas, this book attempts to explain—and does so in an interesting style—just what motivates the building industry in this country.

Specifically, the text devotes a chapter to each of the men or functions involved in construction. Men and methods, the first chapter, sets the pace, and following chapters deal with the real estate operator, the lender, the contractor, the labor force, the manufacturer, the engineer, the corporate client, the public, and the architect.

Each of these facets of construction is introduced to the reader (and to each other, say the authors) for the first time as integral parts of the billion-dollar building industry.

As an addition to the plant engineer's library, *Building, U.S.A.* should prove interesting reading, and provide a valuable insight into what makes the construction industry tick, and how its varied components work together.

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Is good boiler housekeeping in your plant beset by sludge, scale and corrosion? Are these enemies of efficiency increasing downtime and maintenance costs, fighting company profits and your own career?

The Power Show can help you find better ways to fight back. It can help you keep your company's profits growing and your own job on the upgrade by keeping you up-to-date on water softeners, demineralizers, dealkilizers, filters, deaerating heaters and clarifiers —PLUS a broad line of other power and allied equipment.

Only at the Power Show do you have the opportunity to investigate, compare and get the right answers, face-to-face, from the manufacturers themselves. Only at the Power Show can you see over 250 leading suppliers' products, all conveniently grouped together at one time.

Make sure you're there. Everyone else will be!

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NOV. 28—DEC. 2, 1960

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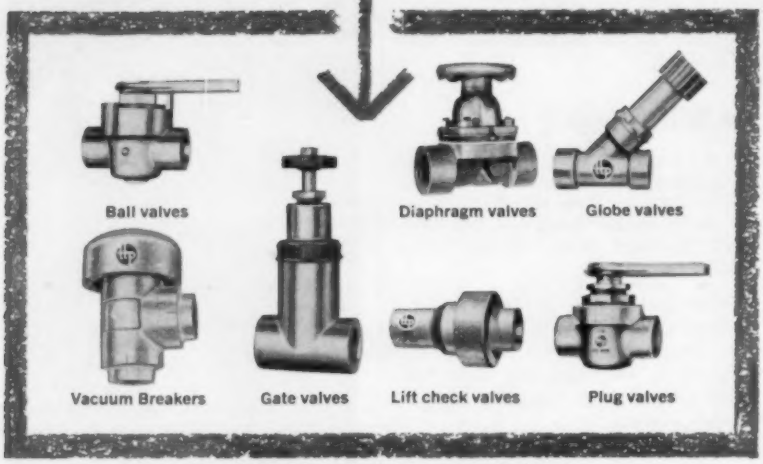
With the introduction of a line of ball valves, Tube Turns Plastics now makes available a total of 7 different UPVC valves for corrosive services. Some are also available in "Penton" (chlorinated polyether) for higher temperatures. All are made for socket, threaded or flange connections in a range of sizes, and are available from your nearby TTP distributor. For details, write TUBE TURNS PLASTICS, INC., Dept. PE-9, 2929 Magazine Street, Louisville 1, Kentucky.



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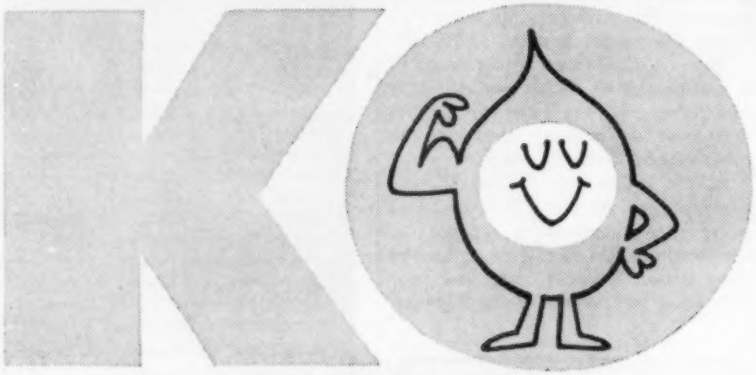
Knock out grease and dirt with



Safety Solvents!

KO9 cleans electric motors *fast*! Just immerse the running motor, remove it in minutes, as clean as new. No work for you...it actually cleans itself.

KO9 also cleans and degreases motors, generators, controllers, switches, panels, instruments, refrigeration lines. You name it...KO9 can clean it!

KO13 the amazing general purpose safety solvent, cleans almost anything...leaves surfaces smooth and sparkling! Write for literature today!

KOR CORPORATION 79 Box 485, Gary, Indiana

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INDUSTRIAL FILMS

Industrial Plant Construction

A COLOR FILM entitled "The Master Builders," which depicts the construction of a large industrial plant is now available for distribution to manufacturing companies and engineering groups.

The 16mm sound film was more than two years in production. It covers the construction, from ground breaking to mechanical installation and completion of a vast aluminum producing plant in Ohio and an alumina plant in Louisiana. Running time is 27 minutes. The professionally produced film shows and describes earthmoving and site stabilization problems, steel erection, and general construction methods and procedures. A good portion of the film is devoted to mechanical installation work and the completed production facilities.

The film is available to plant engineering and maintenance groups as well as new plant development agencies for private showing. Prints are available through the New York office of the F. H. McGraw Company, 51 East 42nd St., at no cost except for a small handling and insurance charge.

Powered Hand Trucks

A SOUND and color slide film showing where "Powrworker" battery-powered hand trucks can be used advantageously is now available.

Called "Lifting the Burden," the slide film includes applications of pallet, platform, stacker, tugger and high-lift platform trucks in areas where rider trucks are not economically feasible or where space is too limited for operation of rider-type trucks. A wide line of attachments which adapt trucks for many jobs is also shown and described.

"Lifting the Burden" has a viewing time of 20 minutes and is available free. To request a copy, write: Slide Film Department, Industrial Truck Division, Clark Equipment Company, Battle Creek, Mich.

How To Give a Filmstrip Show

WITH THE GROWING use of slides and filmstrips, there has come a need for more information about this medium and how to use it.

To meet this need, a booklet entitled "What You Need To Know About Filmstrip Slide Shows" has been written by Herbert C. Rosenthal,

(Acid) bubble bath can't etch concrete floor coated with NEW GLID-CRETE

Floors "floored" by acids and chemicals? Here's the answer . . .

New GLID-CRETE, based on a catalyzed epoxy resin, used to patch or resurface concrete floors was given the acid test. A 50% solution of hydrochloric acid was poured on bare concrete and on concrete topped with an ⅛" of GLID-CRETE. The concrete was badly etched. GLID-CRETE was unharmed—and will stay that way!

Easy to apply with spray or trowel, GLID-CRETE, is six times more abrasion and impact resistant than concrete. It offers many outstanding advantages in the maintenance, repair and construction of masonry floors and structures.

GLID-CRETE can save you money. Time too. Write today for complete information.

QUALITY Glidden PRODUCTS

MAINTENANCE FINISHES DIVISION
The Glidden Company
900 Union Commerce Building
Cleveland 14, Ohio
In Canada: The Glidden Company, Ltd., Toronto, Ontario

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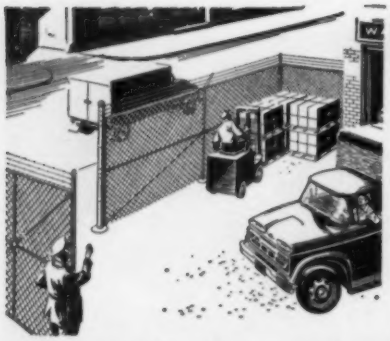


About that property of yours...

PAGE FENCE

These 3 VALUES are important

1. QUALITY is important. When you invest in a fence you want it to last for a long, long time. When you specify PAGE you get 77 years of our experience in the design and manufacture of a quality fence. Page Fence is engineered for long-lasting service and is covered by a Registered Certificate of Quality.

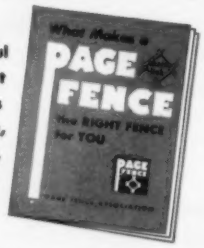
2. WIDE CHOICE is important. For example, we offer a choice of 4 chain link fabrics—ACCO-Aluminized, our latest development, or galvanized steel, stainless, or solid aluminum. Each of these has characteristics which meet individual preferences or make it more suitable to meet certain climatic or service conditions. Furthermore, there are 8 basic fence designs and 6 gate styles. No other company can serve you with so wide a selection.

3. INSTALLATION is important, too. A fence can be no better than the quality of its erection. The Page Fence Member in your locality is trained, experienced, responsible, and interested in your satisfaction.

• • •

When you write us, we'll send you the whole story in a helpful booklet, and the name of our nearest Member. Call him, he will gladly suggest the best answer to your property protection problem.

Helpful booklet describes fence styles, gates and, components



PAGE FENCE ASSOCIATION
National Headquarters • Monessen, Pa.
A product of Page Steel & Wire Division
American Chain & Cable Co., Inc.

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INDUSTRIAL FILMS

Director of Graphics Institute and just released by that organization.

The booklet gives a comprehensive picture of the benefits to be gained, the problems to be faced, and the procedure in setting up a filmstrip/slide show program.

Chapter headings include: What are the benefits to be gained from using filmstrip/slide shows? What does a typical filmstrip/slide show cost to produce? What are the main ways you can use filmstrip/slide shows? Where and how do you show a filmstrip/slide show? How much does projection equipment cost?

As a further working guide, the booklet cites a specific case history to show the public relations mileage that can be gotten out of a filmstrip/slide show.

Copies of the booklet are available at one dollar from Graphics Institute, The Penthouse, 42 West 39 Street, New York 18, N. Y.

Cross-Country Conveyor

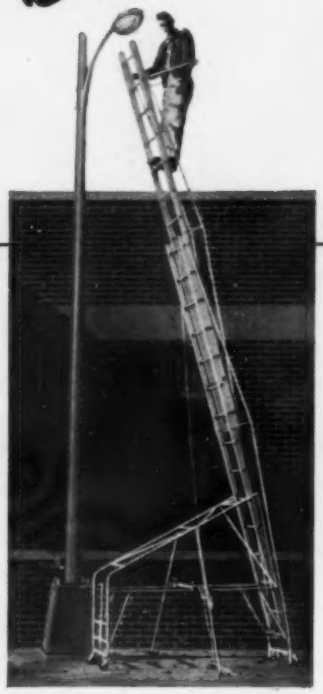
THE WORLD'S LONGEST permanent transport belt conveyor system, 5½ miles in length, is the subject of a new 16mm sound and color, 22-minute motion picture entitled "Ideal Transport Story."

The film shows all phases of construction of the unique, new conveyor system from survey and site

clearance through operation—including interesting shots from the air. The all-weather conveyor winds through the Oklahoma countryside in the shape of a giant letter "S" carrying limestone and shale at the rate of 1000 tons an hour from Ideal Cement Company's quarry in Lawrence to its plant in Ada.

This is the first major conveyor installation supported by prestressed concrete structures and it is made up of seven separate belt conveyors, arranged to feed onto each other consecutively. One conveyor, almost 2¼ miles in length, is the longest single flight ever built. The conveyor system

FOR MORE USES... MORE SAFETY— BUY Bally-Hi



Open construction design allows the "Bally-Hi"—a two-stage ladder mounted on a wheeled frame—to move between and over obstacles such as machines—where ordinary ladders can't go. Collapsible outriggers prevent tipping. Reaches heights to 25 ft., anchors to floor firmly, goes through average size doorways when collapsed. Equipped with extra safety and comfort features that contribute to the user's sense of security. "Bally-Hi" may be truck-mounted.

Ballymore "Safety-Step" ladders serve industry.

WITH OR WITHOUT HANDRAILS

Ballymore

For complete details write to BALLYMORE COMPANY WEST CHESTER 29, PA.

BALLYMORE
EQUIPMENT FOR WORKING *Safely* ABOVE FLOOR LEVEL

CALL YOUR LOCAL DISTRIBUTOR

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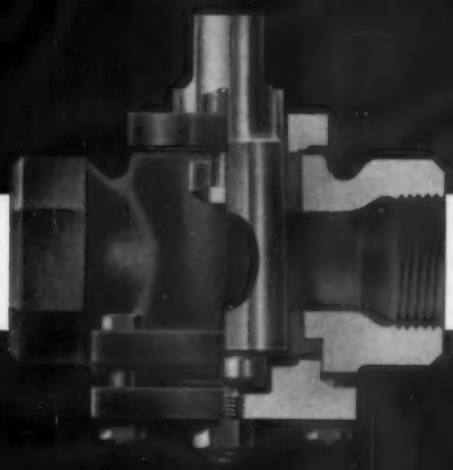
Put this in your pipe and forget it!



Get Durco Sleeveline Type F non-lubricated plug valves for your most severe corrosive or erosive services

You can handle acids such as sulphuric, hydrofluoric and nitric; solvents, caustics, chlorine gas or liquid, chlorinated organics, plastic resins, high vacuums and corrosive slurries with little or no maintenance problems.

Durco Type F valves are available in Durimet-20, 316 Stainless, Monel, Chlorimet-2, Chlorimet-3, and Nickel. Flanged or screwed, in sizes from ½" to 6". 2 or 3 way design, 150 psi and 300 psi ratings.

Write today for informative Bulletin V/4b.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON COMPANY INC., Dayton, Ohio / Valves • Pumps • Filters • Process Equipment

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New Way to Stop Faucet Leaks!

★ 9-in-10 washers are fastened with TOO LONG or SHORT SCREWS thus loosen and destroy themselves. Leaks quickly follow!

34 YEARS OF RESEARCH REVEALS NEW SOLUTION

★ New, patented 'Sexauer' SELF-LOCK screws have imbedded expanding NYLON PLUG. They lock at required depth AUTOMATICALLY, hold washers firmly! Made of MONEL, they are rustproof, non-corroding. Heads can't twist off. Screw slots can't distort.

★ NEW, improved 'Sexauer' EASY-TITE faucet washers are made of super-tough, pliable du Pont compound (not rubber or fibre). Reinforced, like a tire, with a vulcanized layer of Fiberglas, they resist distortion and splitting from shut-off grind and squeeze.

★ Faucet leaks repaired with 'Sexauer' EASY-TITE washers and SELF-LOCK screws outlast ordinary repairs "6-to-1"!

HIDDEN COSTS OF FAUCET LEAKS!

Hackensack, N.J. Water Co. and American Gas Association figures prove stopping just ONE PIN-HOLE SIZE (1/32") LEAK saves you 8,000 gal. water quarterly. A HOT WATER FAUCET LEAK repair saves you over $7.58 QUARTERLY in fuel and water bills. Fewer leaks also produce important savings on MATERIALS, LABOR and COSTLY FIXTURE REPLACEMENTS!

A 'Sexauer' Technician will make available our NEW Catalog, Edition "J", listing our entire line of over 3,000 TRIPLE-WEAR plumbing repair parts and tools. He will survey your fixtures, determine the repair parts needed and establish an efficient stock arrangement and control to prevent costly overstocking or shortages. You get this service without obligation. *Act now!*

J. A. Sexauer Mfg. Co. Inc., Dept. S-90
2503-05 Third Ave., New York 51, N.Y.
Please send me a copy of your Catalog "J"
Name _____ Title _____
Organization _____
Bus. Address _____
City _____ Zone _____ State _____

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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INDUSTRIAL FILMS

crosses two highways and two railroads.

The film may be borrowed without cost on letterhead request for showing in the U.S.A., from Link-Belt Company, Dept PR, Prudential Plaza, Chicago 1, Illinois.

Spray Painting

TWO SOUND-COLOR-slide films have recently been made available for showing to persons interested in spray finishing equipment and systems.

One film, entitled "Finish First," is a general interest film dealing with spray finishing, and suggesting several fundamental approaches to the finishing problem. The film stresses, for example, the importance of the three basic elements inherent in good finishing —material, operator, and equipment.

The other film, entitled "Make Mine Green," is tailored to the industrial user of spray equipment, who is supplied by an industrial jobber. Suggestions are offered on how users can more successfully work with jobbers in the solution of their problems. The film dramatizes real-life situations to show how an actual problem was solved.

Neither film is a cartoon presentation, although some cartoons are used for interest and illustration. Both are entertaining as well as informative.

Persons wishing to arrange a showing of either film may do so by contacting the Binks representative in their area. Or, write to Mr. B. J. Hedger, Binks Manufacturing Company, 3114 Carroll Ave., Chicago 12, Illinois.

$11,000

in fuel savings a year

when Space Heaters replaced steam

This was the problem . . . a plant expansion program had added many square feet to existing structures, plus two new buildings. The present steam heating system was inadequate, so management took a long, hard look at heating costs. Rejuvenating the present boiler or installing a new one large enough to provide both heat and process steam involved a major expenditure. In addition, fuel and maintenance costs were high.

This was the solution . . . sixteen Dravo Warm Air Space Heaters of various sizes were installed. Now all working areas in the plant are held at a comfortable 70°, including offices and receiving room. Cold air is drawn into the heaters at floor level, and discharged *above* workers' heads. Warm air is retained in the work area instead of rising to the roof.

These were the results . . . Fuel savings alone amounted to $11,000 per year, a reduction of 48%. In addition, the costs of full-time boiler room employees, and of boiler and steam line maintenance are saved. Since each heater is controlled by an individual thermostat, working conditions are kept at optimum. In the summer, fresh air is circulated by the heater fans.

Interested . . . in what Dravo Counterflo Heaters can do for you? Mail the coupon for full information on the Case Study outlined above, and on money-saving Dravo Heaters.

DRAVO
CORPORATION

Department P-13, Room M-214
Pittsburgh 25, Pa.

Send me free copy of 12-page report on warm air space heating and the facts on the company mentioned above.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

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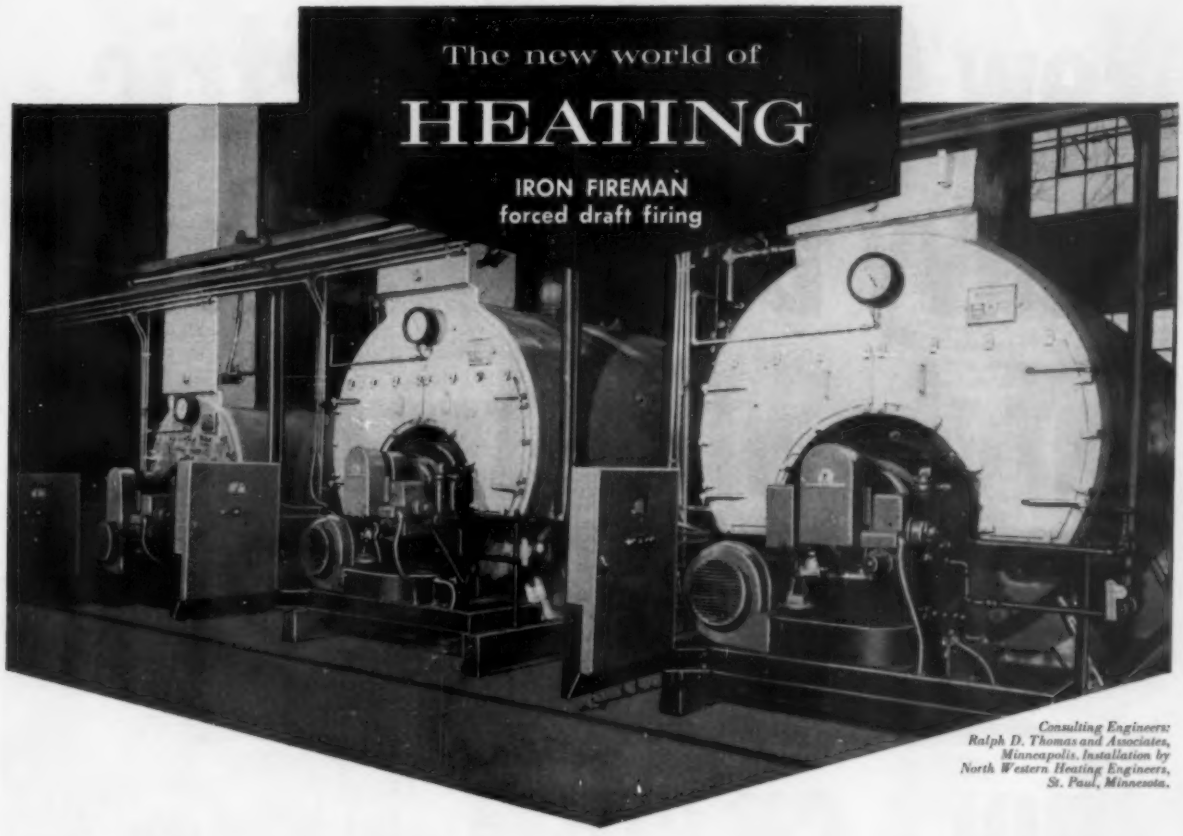

Consulting Engineers: Ralph D. Thomas and Associates, Minneapolis. Installation by North Western Heating Engineers, St. Paul, Minnesota.

This new heating plant increased boiler capacity 70%, yet will return the investment in 7 years

The Minnesota Masonic Home in Minneapolis faced a problem that is familiar to many owners of old heating plants—should the old plant be modernized or replaced?

After a thorough study of several alternatives, the engineering firm of Ralph D. Thomas and Associates recommended a complete replacement. The three Iron Fireman-Kewanee boiler-burner units shown above provide extra capacity for future needs, while cutting steam costs so sharply that engineers estimated they will pay for themselves in seven years.

COMPLETE, PACKAGED FIRING SYSTEM

The first big saving was in installation—the three units were moved in intact. No boiler settings, no brickwork, no special wiring required. The factory assembled units included boilers, burners, forced draft air supply, wired and tested control panels and fuel systems, all mounted on a permanent base. Low operating costs were the result of high combustion efficiencies (reduced fuel bills) and low maintenance. With packaged installation, factory responsibility covers practically the entire job.

FOR OIL, GAS OR DUAL-FUEL FIRING

Oil models fire any grade of oil from No. 2 to No. 6. Gas models take any type of high or low pressure gas. With dual-fuel models, fuels can be switched at a moment's notice with either manual or automatic controls.

Mail coupon for full information.

IRON FIREMAN

HEATING AND AIR CONDITIONING
AIRCRAFT COMPONENTS AND EQUIPMENT
MISSILE AND AIRCRAFT GYROSCOPES
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IRON FIREMAN MFG. CO., 3069 W. 106th St., Cleveland 11, Ohio
(In Canada, 80 Ward St., Toronto)

Please send complete technical description and specifications on Iron Fireman forced draft firing.

Name_____

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Address_____

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New General Electric Heavy Duty Switches safely withstand 200,000-amp. short circuit!

All new General Electric heavy duty (TH) and heavy duty interrupter (THD) safety switches were recently tested for short circuit operation with current limiting fuses at G.E.'s High Voltage Test Laboratory in Philadelphia. The results prove that both TH and THD switches will stand up under a 200,000-ampere short circuit when used with General Electric CLF* high interrupting capacity fuses or other current limiting fuses of comparable characteristics as defined in NEMA Standards FU1-1959. An independent engineering firm supervised the tests and certified all results.

General Electric Switches are rated 30 to 600 amperes, 240 to 600 volts, and are available in both NEMA 1 and gasketed 1A enclosures. See your G-E Distributor.

*TRADE-MARK

Typical 3 Phase Tests of G-E Heavy Duty Safety Switches at 200,000 Amperes Available

Type Switch	Average Available Symmetrical Amperes	Circuit Voltage		Duration of Max. Peak Current Flow	Type of Test	
		Open	Closed		Close Device On Fault	Close Fault On Device
Heavy Duty 600 Volts a.c. Type TH	210,000	610	497	18°	X	
	210,000	610	497	36°		X
Heavy Duty Interrupter 250 Volts a.c. Type THD	203,000	256	222	18°	X	
	203,000	256	222	18°		X
Heavy Duty Interrupter 600 Volts a.c. Type THD	210,000	610	497	18°	X	
	210,000	610	497	36°		X

GENERAL ELECTRIC

Circuit Protective Devices Dept., Plainville, Conn.

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BULLETINS

(Begins on page 27)

HEATING, VENTILATING AND AIR CONDITIONING

Air Intake Units—Gas and steam fired air intake units and unit heaters are featured in 12-pp Bulletin A-117. Includes construction and control details, performance data and dimensions. Hartzell Propeller Fan Co.

▲ For a copy, circle 148 on Post Card

How Much for Heat?—For determining heating costs and savings, this cauculator is an easy-to-read slide rule covering use of Thermobloc direct fired warm air heaters. You merely determine the square footage of your plant and locate that figure on the rule. You can then read the number and size of heaters needed, and dollar savings realized by using these heaters. The Wanson Corp

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Power Roof Ventilators—Features and advantages of power roof ventilators with centrifugal type blades are detailed in Bulletin 60A. Certified capacity table is included. Hirschman-Pohle Co., Inc.

▲ For a copy, circle 150 on Post Card

Roof-Top Conditioners—Advantages to be gained from installing air conditioning units on the roof are fully detailed in this product bulletin. Photos of typical installations are included, also cooling specifications. Melchior, Armstrong, Dessau Co.

▲ For a copy, circle 151 on Post Card

WATER, WASTE MANAGEMENT

Water Treatment—Process Bulletin C2 describes a comprehensive method for treating and protecting recirculating water equipment and process water systems. Application methods are described. Nalco Chemical Co.

▲ For a copy, circle 152 on Post Card

Industrial Water Service—Importance of water to industry and advantages of an industrial water consulting service are detailed in this 22-pp bulletin. Specific examples of benefits offered to typical users of the consulting system are given. Hall Laboratories Div., Hagan Chemicals & Controls, Inc.

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Corrosion Inhibitor—Bulletin CSP-935 describes a corrosion inhibiting compound for treatment of recirculating cooling water systems. Performance data in corrosion control, elimination of sludge deposition, concentration of make-up water detailed. Calgon Co., Div. Hagan Chemicals & Controls, Inc.

▲ For a copy, circle 154 on Post Card

Poly-Metallic Cooling Systems—Effects of utilizing dissimilar metals in cooling systems and a discussion of what causes galvanic corrosion are covered in 10-pp Reprint 91. Points up problems associated with poly-metallic closed and open-recirculating cooling systems and recommends type of corrosion inhibitors designed for optimum protection of metals. Nalco Chemical Co.

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Cooling Tower Maintenance—"How To Extend Cooling Tower Life" is the subject of this water conditioning data sheet. Discusses how deterioration of cooling tower wood by chemical, biological and physical factors shortens life of cooling towers. Betz Laboratories, Inc.

▲ For a copy, circle 156 on Post Card

Water, Waste Treatment—Methods and equipment for treating metal finishing process water and wastes are covered in Technical Reprint T-180. Discusses reasons for treatment, how to investigate problem, modern treatment methods for hexavalent chromium, cyanides, acids and alkalies, oily wastes and process water. Graver Water Conditioning Co.

▲ For a copy, circle 157 on Post Card

Sludge Remover—Twelve-pp Bulletin 315-81 describes features and advantages of the Rex Unitube Tow-Bro sludge remover for industrial and municipal use. Explains principle of sludge removal through suction action and includes photos of typical installations. Chain Belt Co.

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INSTRUMENTS, CONTROLS

Indicating Pneumatic Controllers—Six-pp Bulletin DMO58 describes indicating pneumatic controllers designed for maximum performance and durability. Specifications are included for units controlling pressure, vacuum, liquid level, flow, temperature and humidity. The Bristol Co.

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Electronic Instruments—Illustrated and described in this 12-pp product bulletin are electronic and electromechanical instrument systems. Descriptions of products and services are given, with examples of the indicating and control systems designed for industrial and other applications. The Liquidometer Corp.

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Meters, Feeders, Controls—Featured in 8-pp Bulletin 0001.20-1 is a line of meters, feeders and controls. Described are butterfly valves, supervisory control systems, totalizing meters, water and waste treatment equipment and systems, flow meters, process instrumentation, feeders for solids and liquids and blenders for liquids. B-I-F Industries, Inc.

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Can Line Automation—Controls for can line automation which operate on an electromagnetic proximity principle are described in this 12-pp bulletin. Details of operation and typical uses are discussed. Peco Corp.

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Closed Circuit TV—This 9-pp illustrated and lightly written booklet explains industrial and commercial television in layman's language. Covers basic applications from hazardous viewing in production to plant surveillance, as well as many others. General Precision, Inc.

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Thermocouple Components—Featured in 28-pp Catalog G100-3 are thermocouple components, including bare elements, elements with insulators, insulators, metal and ceramic protecting tubes, heads, blocks, connectors and miscellaneous fittings. Contains specifications and ordering information on replaceable components for company's thermocouple assemblies. Minneapolis-Honeywell Regulator Co.

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Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on the facing page.

Timers and Counters—Condensed Catalog D-31 contains 30-pp of reference data on automation components and control systems, covering latest timing components and linear measuring systems. Standard timers and counters are reviewed, as well as electronic timers, special timers, package control systems, test equipment, switches, controllers, contractors and valves. Automatic Timing & Controls, Inc.

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ELECTRICAL

On Electric Motor Design—Twelve-pp Bulletin PB 6000-10 develops the premise that electric motor design consists of a series of concentric circles. Large close-up photos illustrate step-by-step manufacturing process, each supporting the premise that good motor design depends on concentricity. Elliott Co.

▲ For a copy, circle 167 on Post Card

Lighter, Stronger Transformers—Eight-pp Bulletin GEA-6832A describes distribution equipment transformers, redesigned to be mechanically stronger and 14 per cent lighter than previous models. Tables and diagrams give electrical and mechanical data. General Electric Co.

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Dry-Type Transformers—Features which contribute to speedy installation of small, light dry-type transformers are illustrated and described in Bulletin 61B8222B. Dimensional diagrams and data are included. Allis-Chalmers Mfg. Co.

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Packaged Substations—Compact, packaged electrical substations which can be located right at the load areas are featured in 8-pp Bulletin 5601-1A. Component details are illustrated and described, with sketches and photos. I-T-E Circuit Breaker Co.

▲ For a copy, circle 170 on Post Card

Rigid Aluminum Conduit—Data on rigid aluminum electrical conduit is assembled in this 32-pp manual.

BULLETINS

(Begins on page 27)

Physical properties and performance factors of rigid aluminum conduit are compared to steel conduit in indexed charts, tables and text. Kaiser Aluminum & Chemical Sales, Inc.

▲ For a copy, circle 171 on Post Card

Low-Impedance Bus Duct—Application data for low-impedance bus duct is contained in 20-pp Application Data 30-662. Descriptions, drawings, dimensions, specifications, and engineering data give specific information needed to install this type of bus duct. Westinghouse Electric Corp.

▲ For a copy, circle 172 on Post Card

Metal-Clad Switchgear—Comprehensive information on stored energy metal-clad switchgear is presented in 20-pp Bulletin 2801-2A. Construction and performance features, ratings and dimensions are included, as well as photos, sketches, diagrams, charts and tables. I-T-E Circuit Breaker Co.

▲ For a copy, circle 173 on Post Card

For Switchgear Protection—Eight-pp Bulletin 6020 describes the Fusematic concept in switchgear protection, based on an integral combination of a power circuit breaker and current-limiting fuse. Applications are detailed, along with parts and technical data. Federal Pacific Electric Co.

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D-C Contactors, Relays—Illustrated and described in 32-pp Bulletin GEA-6621A of General Electric Co. are contactors and relays for all d-c industrial control. Discusses "building-block" approach and includes illustrations, layout and schematic diagrams, application data and specifications. General Electric Co.

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Magnetic Level Switches—Detailed information on basic types of magnetic level switches is presented in 34-pp Bulletin MC211/5709. Includes construction and operation details, drawing of typical installations, wiring diagrams. Bestobell (Canada) Limited.

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Stationary Batteries—Features and advantages of Gould Plante batteries for use in switchgear, alarm systems, telephone, control, signalling or emergency light and power applications are detailed in 12-pp Bulletin GB 1783-B. Engineering specifications, graphs of discharge characteristics, dimensional data, are included. Gould-National Batteries, Inc.

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Electrical Insulating Oils—Bulletin 58, 6 pp, gives technical information on insulating oils for transformers and cables. Discusses functions of a transformer oil; gassing characteristics of oils, properties of electrical oils, uses for inhibited and uninhibited oils. Information on cable oils includes discussion of requirements of three basic types of cables; viscosity-temperature relationships of oils. Sun Oil Co.

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Speed Variator—Detailed information on the Thymotrol speed variator, which uses Thyratron tubes to convert a-c to d-c power, is contained in 8-pp Bulletin Gea-7019. Describes adaptability of the drive to machine feed and spindle applications, conveyor systems, processing equipment, other applications where precise speed control is essential. General Electric Co.

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BOILERS, HEAT EXCHANGERS

Forced Draft Boilers—Bulletin 149D, 12 pp, describes Kewanee forced-draft Scotch type packaged boilers for high and low pressure industrial and other applications. These boilers can be fired with natural gas, fuel oil or combination gas/oil. Illustrated with photos and line drawings, bulletin gives ratings, dimensions and technical data. Industrial Div., American-Standard.

▲ For a copy, circle 181 on Post Card

Waste Heat Boilers—Bulletin 1700 describes forced recirculation generators designed to make maximum use of waste heat from industrial and process heat sources. Contains engineering drawings and specifications. The International Boiler Works Co.

▲ For a copy, circle 182 on Post Card

Heat Exchangers—Illustrated and described in Bulletin HE-260 are heat exchangers for heating and cooling a wide variety of fluids. Describes various heating and refrigeration components. Bell & Gossett Co.

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Low Pressure Heat Exchangers—Eight-pp Bulletin 110 describes low pressure double pipe heat exchangers. Salient features of design are discussed, including one-piece fintube, and data on thermal and mechanical efficiency, materials of construction, and dimensions and specifications included. Brown Fintube Co.

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OTHER EQUIPMENT

Scaffold Hoist—Features and advantages of the Skyclimber which climbs the wire rather than spooling wire on drum are detailed in Bulletin 5909. Describes convertibility feature from manual, to air-powered to electric-powered. Western Gear Corp.

▲ For a copy, circle 185 on Post Card

Project Engineering Services—Twelve-pp Bulletin 8010 describes engineering services in the development of complete plants on a world-wide basis. Services covered include laboratory testing, pilot plant demonstration, flowsheet preparation and engineering studies, cost estimates, plant design. Dorr-Oliver Inc.

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Industrial Lighting—Construction features and advantages of localized lighting units for a variety of industrial applications are detailed in 12-pp Catalog 66. Dimensional data and illustrations are included. Adjustable Fixture Co.

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Current Publications Of Special Interest

Metal Framing—Catalog 710 is a 36-pp metal framing construction and maintenance handbook providing application and installation information, specifications and methods of attaching to structures using Unistrut metal framing. Performance and engineering data included, as well as pictures showing applications such as pipe, conduit supports. Unistrut Products Co.

▲ For a copy, circle 188 on Card

High Temp Water Systems—Excellent information on high temperature water systems is included in this 72-pp catalog featuring manufacturer's Flo-Kontrold line of high temperature boilers. Besides giving specifications and design book provides an analysis of high temperature water systems, reference lists of controls and instruments for H.T.W. systems, and of standardized H.T.W. valves, pumps, exchangers unit heaters etc. Catalog is available to qualified plant engineers; please state your job title Boiler Engineering & Supply Co., Inc.

▲ For a copy, circle 189 on Card

Tube Fittings—This 118-pp catalog contains comprehensive information on company's tube fittings, including the O-ring seal fittings. Each specification table is coupled with a large, near-actual-size cutaway drawing with all dimensions on illustration keyed to specifications and dimensions table. Available to qualified engineers, please state your title. The Lenz Co.

▲ For a copy, circle 190 on Card

Fluids and Lubricants—Properties and uses of polyalkylene glycol fluids and lubricants are detailed in this 52-pp catalog. Gives physical properties, physiological properties, physical and chemical analytical methods, storage and handling instructions, and selection data. Applications for hydraulic systems, gear lubrication, heat-transfer applications, brake fluids, brake parts coatings, high-temperature lubrication, etc. described. Union Carbide Chemicals Co.

▲ For a copy, circle 191 on Card

Metal Raceways, Fittings—Catalog and Wiring Guide 22 contains 152 pp of data on surface metal raceways and fittings, multi-outlet assemblies, and lighting equipment. Included is a section on National Electrical Code as it affects company's product, including tables of capacities, as well as installation and application information. The Wiremold Co.

▲ For a copy, circle 192 on Card

Fuel Burning Systems—Features and operations of fuel burning systems for oil, gas or combination oil/gas fuels are detailed in 8-pp Bulletin 1270. Typical burner arrangements are illustrated. Orr & Sembower, Inc.

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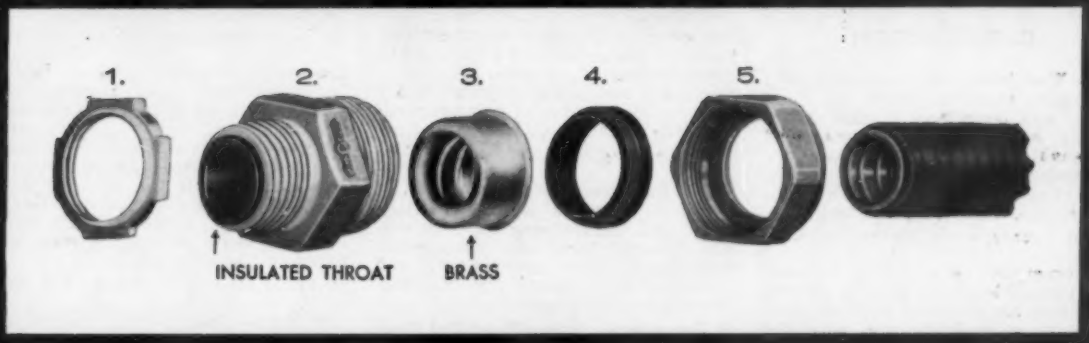
BEST NEWS YET IN LIQUID TITE CONNECTORS

Gedney insulated throat for top protection, easier pull-through



MALLEABLE IRON

Now you can order Gedney Liquid-Tite Connectors with the added protection of insulated throats. You get faster, easier pull-through . . . eliminate dangerous wire fraying. Gedney Liquid-Tite Connectors are the finest, most efficient connectors available for use with liquid-tite conduits. They're precision-made from top grade malleable iron . . . designed to give lifetime dependable service in oil- and water-tight flexible raceways.

Gedney Liquid-Tite Connectors are supplied in standard sizes from ⅜" to 2" . . . straight, 45° or 90° . . . with or without insulated throats. Be sure . . . specify Gedney.

As shown from left to right in illustration, Gedney Liquid-Tite Connectors consist of:

1. Locknut — nut stock steel — cadmium-plated.
2. Main fitting — straight, 45° or 90° angle — malleable iron — cadmium-plated. Insulated throat — optional.
3. Grounding brass bushing — 1 piece — threaded to engage spiral of all type conduits.
4. Molded Vinylite sealing ring — pliable — ever-lasting.
5. Gland nut — malleable iron — cadmium-plated.

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ELECTRIC COMPANY
GEDNEY
AMERICAS BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For more facts circle 682 on Reply Card

Plastic Stock Shapes—Sixteen-pp Bulletin AD-177 describes plastic stock shapes, molded and fabricated parts. Photos and specifications are furnished for Teflon in sheets, cementable sheets, tapes, cementable tapes, extruded rods, extruded tubes, molded bars, cylinders. Garlock Inc.

▲ For a copy, circle 194 on Post Card

Work Organizers—Rotary files and rotary-file desks are illustrated and described in this 32-pp bulletin on work organizers. Includes office floor plans and case-history photos and drawings showing space-saving features which will bring the work to the worker. Wassell Organization Inc.

▲ For a copy, circle 195 on Post Card

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 291 and 292.

CONSTRUCTION

Open Web Joists—Standard and long span open web steel joists are illustrated and described in this 38-pp catalog. Advantages of the steel joist construction are detailed, and sections are included on design calculation, properties and dimensions. American Bridge Div., United States Steel Corp.

▲ For a copy, circle 301 on Post Card

Aluminum in Colors—This bulletin introduces Alcoa's Alumalure colored aluminum architectural building sheet products, a complete line of sheet products offered in 11 colors. Aluminum Co. of America.

▲ For a copy, circle 302 on Post Card

Screw Fastening of Aluminum—This 48-pp technical handbook covers various types of standard and special fasteners and fastening systems used to join aluminum assemblies. Supplemented with numerous illustrations and tables, it includes list of manufacturers of special screw fasteners and recommended hole sizes for various types of self-tapping screws in sheet aluminum, other materials. Reynolds Metals Co.

▲ For a copy, circle 303 on Post Card

Acrylic Plastic Sheet—This 12-pp Booklet PL-415 describes properties and characteristics of Plexiglas acrylic plastic sheet. Applications in a variety of industries are illustrated, and advantages detailed. Rohm & Haas Co.

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Basic-Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

▲ For a copy, circle 305 on Post Card

Cold Storage Doors—Detailed information on company's power-operated and hand operated cold storage doors is presented in Catalog 260. Installation and specification data included. Clark Door Co., Inc.

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Rolling Steel Doors—Illustrated and described in 16-pp Catalog G-60 are rolling steel doors designed to meet industrial and other requirements. Details features and engineering specifications of standard hand, mechanically and power-operated doors, and includes tables of clearance dimensions. The R. C. Mahon Co.

▲ For a copy, circle 307 on Post Card

Floor Surfacing—Described in this product bulletin is a copolymerized floor surfacing claiming superior tensile, flexural, bond and compressive strength. Detailed specifications and photos of applications are included. The Master Mechanics Co.

▲ For a copy, circle 308 on Post Card

Corrosion-Proof Flooring—Bulletin 120-A describes a monolithic corrosion-proof flooring material developed for application over concrete to protect against acids, alkalis and solvents. The Ceilcote Co., Inc.

▲ For a copy, circle 309 on Post Card

Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8-pp. Discusses safety features. Alan Wood Steel Co.

▲ For a copy, circle 310 on Post Card

Safety Grating—Steel, aluminum and stainless steel safety grating for a variety of industrial applications is featured in illustrated 24-pp Catalog 5911. Shows typical installations, and includes complete engineering data for erection, as well as load charts. The Globe Co.

▲ For a copy, circle 311 on Post Card

Grating and Treads—Safety, visibility, permanence and easy maintenance are among advantages of open flooring discussed in 28-pp Bulletin 2527-R. Covers use of electro-forged grating in a wide range of industries also features grating applications. Information provided includes types and spacing, bearing bar surfaces and weights, fastening methods, and safe loads. Blaw-Knox Co.

▲ For a copy, circle 312 on Post Card

TOOLS, WELDING AND MACHINE SHOP

Industrial Tools—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools provided. Armstrong Bros. Tool Co.

▲ For a copy, circle 313 on Post Card

Fastening Tool—Illustrated and described in Catalog Form B-141 is the Duo-Jobmaster—designed to handle the tough fastening jobs into steel or concrete. Features and advantages detailed. Ramset Div., Olin Mathieson Chemical Corp.

▲ For a copy, circle 314 on Post Card

Pipe Tools—Ordering and application information on Rigid pipe tools is provided in 16-pp illustrated Catalog 7596R-6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives. The Ridge Tool Co.

▲ For a copy, circle 315 on Post Card

Industrial Wrenches, Hand Tools—Tools for production lines, maintenance work and product servicing are presented in 156-pp Industrial Catalog 58-I. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and roll-cabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, etc. Snap-on Tools Corp.

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Air Tools—The growing use of air tools for a variety of applications in building and industry is covered in 8-pp Bulletin AT-116B. Selection data for air tools and a trouble chart are included. Le Roi Div., Westinghouse Air Brake Co.

▲ For a copy, circle 317 on Post Card

Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44-pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oil and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

▲ For a copy, circle 318 on Post Card

INSULATION

Duct Insulation—Thermal and acoustical duct insulation made of long textile-type glass fiber is illustrated and described in this 8-pp Bulletin ULD-859. Includes detailed application specifications, data on characteristics of the duct liners, thermal efficiencies, sound absorption data. Gustin-Bacon Mfg. Co.

▲ For a copy, circle 319 on Post Card

Insulation Coating—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster, or composition surfaces. Mortell Co.

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Fiber Glass Insulation—Applications and advantages of fiber glass as insulation are illustrated and described in this Product Bulletin F-100. Typical applications are shown and a

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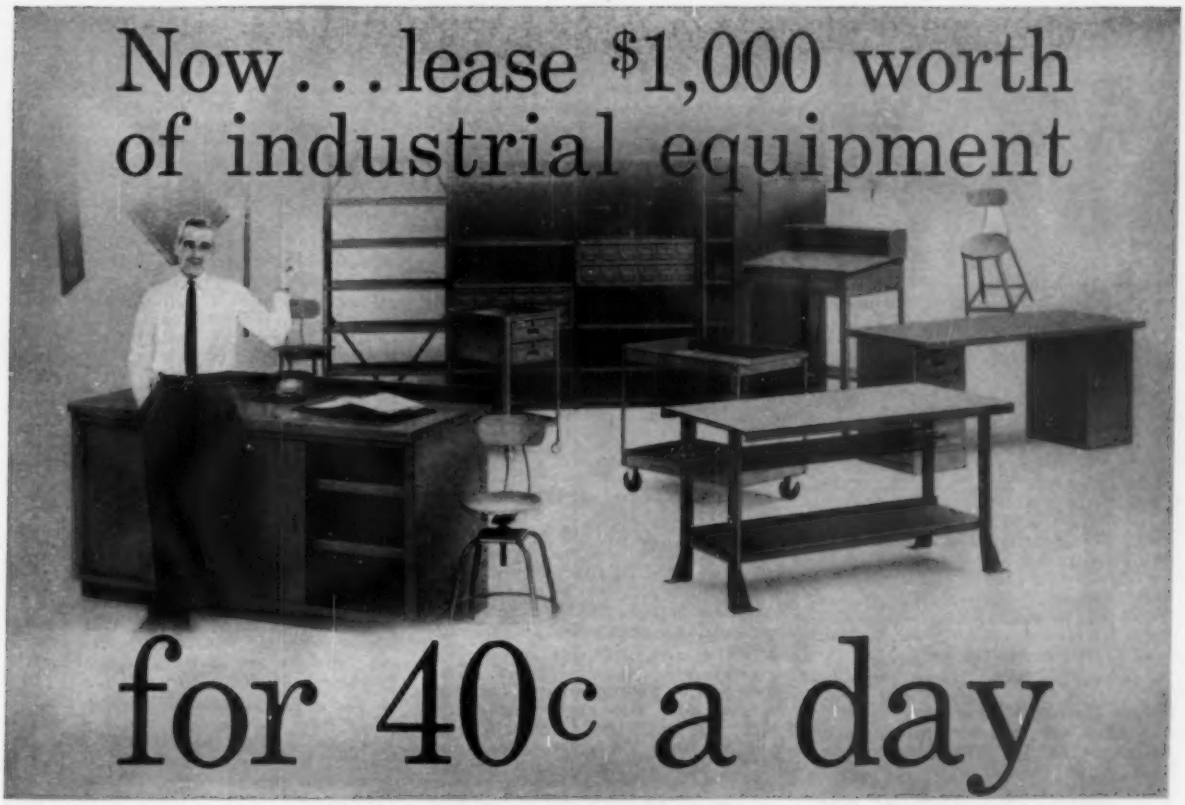

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For more facts circle 683 on Reply Card

DATA FILE

(Begins on page 296)

table of dimensional data included. Pittsburgh Plate Glass Co.

For a copy, circle 321 on Post Card

Flexible Pipe Insulation—This bulletin describes Armaflex 22, a flexible foamed plastic insulation for piping. Gives advantages, physical properties, thickness recommendations and sizes. Tells how to apply it to new or existing piping and fittings. Armstrong Cork Co.

For a copy, circle 322 on Post Card

ELECTRICAL

A-C Motors—Brief presentation of company's major lines of motors, is given in 8-pp, colorfully illustrated Bulletin F-1878. Covers motors from fractional to 1000 hp, horizontal and vertical, dripproof/totally-enclosed/explosion-proof. Shows gearmotors, variable speed and automation systems. Explains special design and construction figures such as Lubriflush transverse bearing lubrication. U.S. Electrical Motors Inc.

For a copy, circle 323 on Post Card

Feeder Busway—Silver-plated copper and aluminum bus bars are featured in 24-pp Catalog 687. Contains detailed engineering and dimensional information on feeder busways and component fittings, as well as voltage drop curves, temperature rise curves, typical layout. National Electric Products Div., H. K. Porter Co., Inc.

For a copy, circle 324 on Post Card

Sheathed Cable—Construction details and performance data on company's sheathed cable, available in steel, copper, aluminum and bronze, are presented in 16-pp Bulletin 1031. Complete engineering data, installation information and test results included. Simplex Wire and Cable Co.

For a copy, circle 325 on Post Card

Safety Mineral Insulated Cable—Bulletin S-2-60, 20-pp, describes cable properties, applications, installation procedure, construction and performance characteristics, electrical and mechanical properties and wiring specifications of mineral insulated cable recommended for hazardous locations. Mineral Insulated Wire Div., General Cable Corp.

For a copy, circle 326 on Post Card

Individually Enclosed Breakers—Featured in 8-pp Bulletin 4261-2B are individually enclosed-low-voltage power circuit breakers featuring visible break disconnect contacts. Selection chart, application data given. I-T-E Circuit Breaker Co.

For a copy, circle 328 on Post Card

Magnetic Starters—Design and construction features of company's a-c magnetic starters are detailed in 8-pp Bulletin PL 12-8-160. Describes arc quenching principle which provides greater contact life under heavy current loads and severe arcing conditions. The Clark Controller Co.

For a copy, circle 330 on Post Card

Electrical Controls—Featured in this 80-pp Bulletin LO-11 is a line of electrical control equipment, including safety switches, service control, load centers, and accessories. Describes design and construction features, and includes detailed selection tables and case dimensions, wire tables. Cutler-Hammer Inc.

For a copy, circle 331 on Post Card

Enclosed Switches—Catalog 83, 22-pp, Catalog 84, 16-pp, and Catalog 101, 24-pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and other types. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

For a copy, circle 333 on Post Card

Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters are used. Allen-Bradley Co.

For a copy, circle 334 on Post Card

Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, tools. Ideal Industries, Inc.

For a copy, circle 335 on Post Card

On Motor-Generator Chargers—Operation and maintenance procedures for automatically controlled vertical motor-generator chargers for lead-acid storage batteries are provided in 8-pp Form 5845. Contains instructions on day-by-day operation and long-range preventive maintenance of equipment. Exide Industrial Div., The Electric Storage Battery Co.

For a copy, circle 336 on Post Card

Control Batteries—Bulletin CP-540 describes features and advantages of a line of batteries for control, switchgear and auxiliary power. Engineering details and specifications are tabulated. C & D Batteries, Inc.

For a copy, circle 337 on Post Card

Testing Instruments—This 16-pp booklet features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features. James G. Biddle Co.

For a copy, circle 339 on Post Card

Electrical Connectors—Shown in 48 pp Bulletin 2711 is a line of electrical connectors, including plugs and receptacles in environment-resistant construction. Design and construction features are detailed and cutaway views and dimensional diagrams included. Crouse-Hinds Co.

For a copy, circle 340 on Post Card

Renewable Fuses—The first section of 12-pp Bulletin 1320, discusses construction and application features of two types of renewable fuses—ferrule and knife-blade—as well as renewal links to facilitate replacement. Salient features are highlighted by sectional and cutaway drawings. Ordering information and specifications of the 250-v and 600-v fuses are covered in the second section. Federal Pacific Electric Co.

For a copy, circle 341 on Post Card

Wiring Devices—Catalog 60, about 80-pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on features, dimensions, applications. Pass & Seymour, Inc.

For a copy, circle 342 on Post Card

Electrical Equipment—Collected in this bound catalog is a series of bulletins on company's line of electrical equipment, including electric motors, generators, motor-generator sets, switchboards and controls. Cutaway views showing details of design and construction are included. The Ideal Electric & Mfg. Co.

For a copy, circle 343 on Post Card

Electrical Equipment Digest—Electrical equipment illustrated and described in 160-pp Catalog Digest 142, includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

For a copy, circle 344 on Post Card

Electrical Equipment—Condensed Catalog No. 9 contains 46-pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

For a copy, circle 345 on Post Card

Protective Equipment Guide—Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1959 National Electrical Code. Besides providing suggestions on how to select right kind of protections, booklet provides motor tables. Bussmann Mfg. Co.

For a copy, circle 346 on Post Card

LIGHTING, COMMUNICATION

Lighting Fixtures—This 12-pp condensed catalog gives a compact presentation of company's fluorescent and Brascolite incandescent luminaries. Data on surface and pendant mounted units, recessed luminaries and Gratelite electric ceilings provided. Edwin F. Guth Co.

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Fixtures for Industry—Details of the CFI—comfort for industry—the uplight fluorescent lighting fixtures are covered in Form OD-1022, 16-pp. Typical installations, comparisons,

Wheeling

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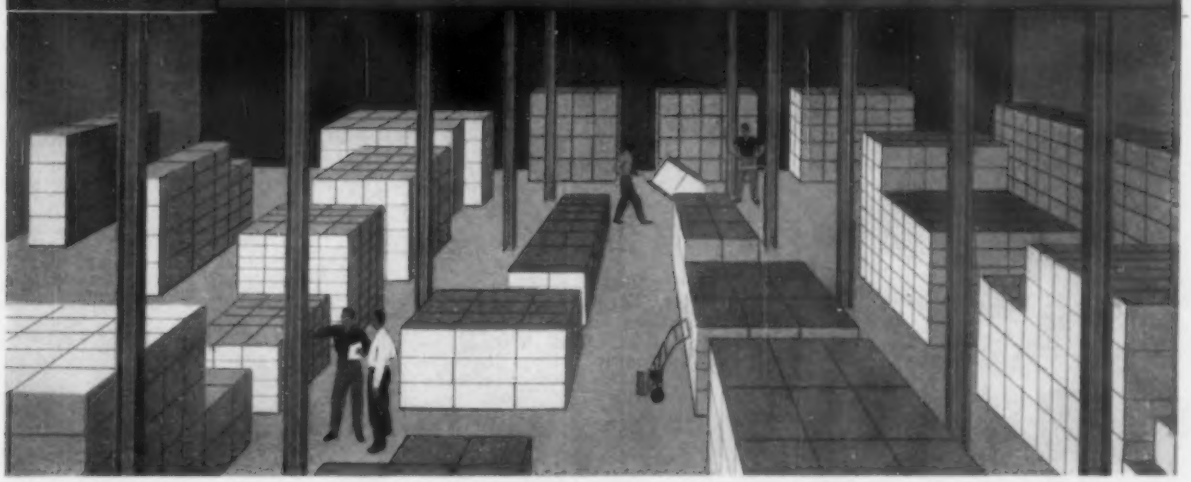

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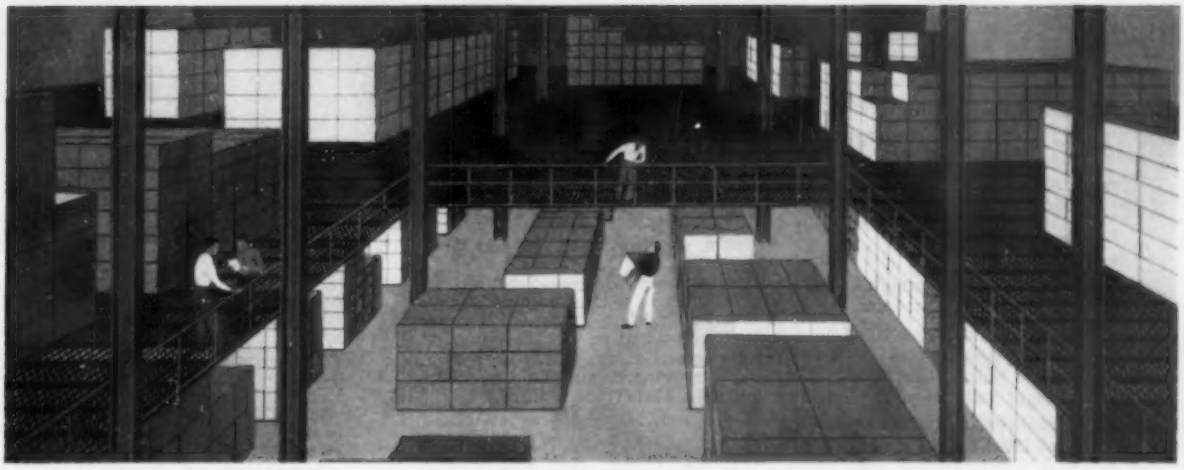

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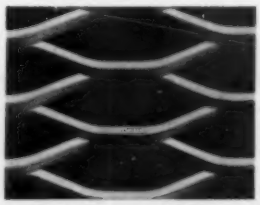

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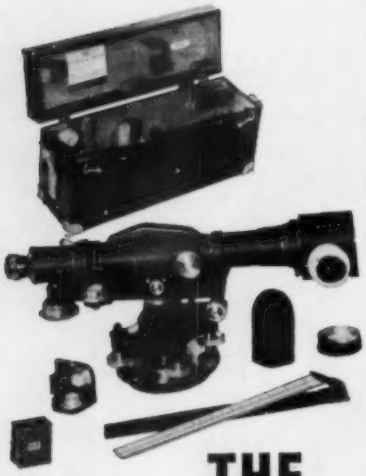

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(Begins on page 296)

size and types, and specifications are included. Day-Brite Lighting, Inc.

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Lighting Supports—Channel type lighting supports for installing wiring and electrical lighting fixtures are described in 8-pp Bulletin G-2. Recommendations for applications, installation procedures, features and data are covered, and photos, dimensional data included. Steel City Electric Co.

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Incandescent Lighting—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapter on basic types, bulb shapes, sizes, glass types and finishes, and bases. Sylvania Electric Products Inc.

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Lamp Annunciators—Outstanding features, operation, indications, mounting, relay cabinet (types, dimensions) relay plug-ins (operational sequences, types) audible signals (bells, buzzers, horns) and ordering information are covered in this 24-pp Bulletin 6041. Drawings, pictures and engraving data are included. Edwards Co., Inc.

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Paging System—Features and advantages of company's selective, wireless paging system are illustrated and described in Form S-150. Describes components and typical installations. Stromberg-Carlson Div., General Dynamics.

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Communication System—Featured in this bulletin is a transistorized communication system designed to provide communication between two or more persons or departments regardless of distance or surrounding noise conditions. Gai-Tronics Corp.

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Signal Equipment—Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts. Federal Sign & Signal Corp.

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PUMPS AND COMPRESSORS

Vertical Turbine Pumps—Featured in this product bulletin is a line of vertical turbine pumps job-engineered to suit specific applications in industry. Design, construction details noted. Fiese & Firstenberger Mfg., Inc.

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Rotary Pumps—Positive displacement principle of company's line of rotary pumps designed to operate well in either direction is detailed in this 8-pp bulletin. Materials selection chart is included, as well as speci-

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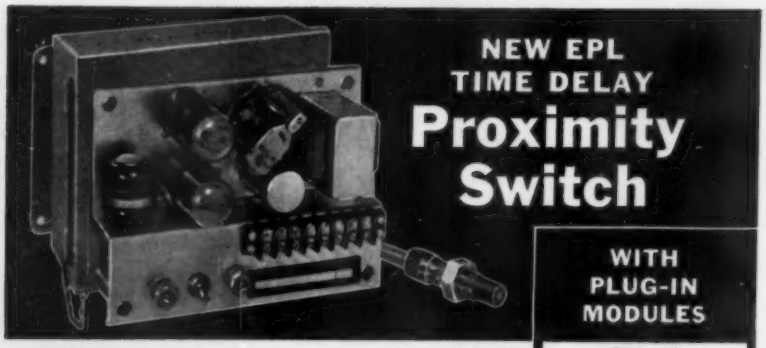

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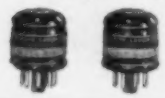

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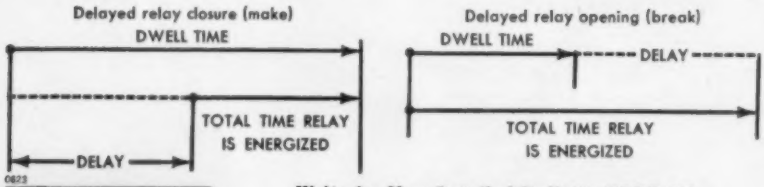

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(Begins on page 296)

fications and dimensional diagrams. Viking Pump Co.

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End Suction Pumps—Described in Bulletin 158 are horizontal shaft, single stage, and suction pumps designed for handling abrasive mixtures and slurries, as well as corrosive and hot liquid. Various models on the line are described as to design and application. Nagle Pumps, Inc.

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Continuous Flow Pump—Bulletin 30-C, 8-pp. outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to nonpourable pastes, abrasives solids. Describes principle of operation, discusses performance, capacities. Robbins & Myers, Inc.

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Angle Air Compressors—Bulletin 625 contains 8-pp of information on features and operation of company's angle air compressors designed to provide efficient air service in small space. Cutaway views showing component features are included, stage-air cooled, industrial air compressors. Pennsylvania Pump & Compressor Co.

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Industrial Compressors—Oil-free heavy-duty industrial compressors are illustrated and described in 12-pp Bulletin A-92. Cutaway views show details of internal design and construction, and bulletin includes photos of typical installations. Joy Mfg. Co.

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Stationary Compressors—Sixteen-pp Catalog 5910 describes features and advantages of a line of stationary air compressors designed for a variety of industrial needs. Tables of weights, code words, and dimensions are included. Schramm, Inc.

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Water-Cooled Compressors—Featured in 12-pp Bulletin WB10 are two-stage water-cooled air compressors designed to meet the demand for small machines having efficiencies comparable to those of large two-stage horizontal compressors. Cutaway views showing component features included. Gardner-Denver Co.

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Process Compressors—Heavy duty balanced opposed compressors for the refining, chemical and petrochemical industries are featured in 46-pp Bulletin 160. Advantages of design and construction are illustrated and described, cross-sections of cylinders and detailed specification are included. Clark Bros. Co.

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PACKINGS, SEALS

Cup Packings—Properties and characteristics of Rex-Syn cup packings —a combination of a plastic resin

don't just patch and paint weather damaged masonry ...rebuild it the Thoro way!

Maintenance men everywhere have found that haphazard patching of masonry with inferior products is a costly mistake. The patched areas deteriorate quickly and permanent repairs become more expensive.

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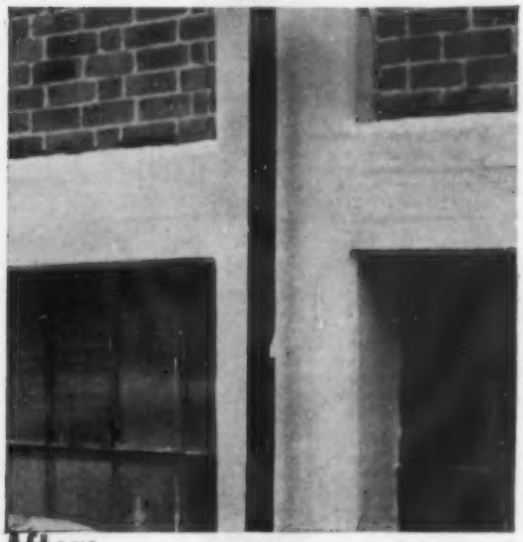

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(Begins on page 296)

elastomer—are described in this bulletin. Gives standard sizes for Rex-Syn and outlines results of field tests. E. F. Houghton & Co.

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Mechanical Seals—The successful sealing of slurries with company's mechanical seals is fully detailed in Technical Bulletin CP-580. Factors to consider and complete selection details are included. Chemical & Power Products, Inc.

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Mechanical Seal—Performance and design features of Mechanipak PK mechanical seals for a variety of operating conditions are detailed in 8-pp Bulletin AD-150. Cutaway views, diagrams and tables of dimensional data included. Garlock, Inc.

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VALVES, PIPING, FITTINGS

Safety-Relief Valves—Liquid relief and special service safety-relief valves, including a new, low cost compact series, are presented in 28-pp Catalog FE-138. Valves shown include types for hydraulic pressure systems, liquefied gases, chemical corrosive service and general industrial service. Sizing information, capacity data given. Farris Engineering Corp.

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Ductile Iron Valves—Features and advantages of ductile iron non-lubricated plug valves with Teflon sleeves are detailed in 6-pp Bulletin V/12a. Cutaway view showing component features is included, along with specifications. The Duriron Co., Inc.

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Stainless Steel Valves—Corrosion resistant stainless steel valves are featured in 32-pp Catalog 59SS. Features of design and construction are shown through cutaway views, and advantages of stainless steel in withstanding corrosive chemicals and atmospheres detailed. Jenkins Bros.

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Choosing the Right Valve—Importance of choosing the right valve is stressed in this 20-pp Bulletin AD-2016. Describes three principal valve types—gate, globe and check valves—their design and service characteristics, lists names of valve parts, describes disc-stem connection, bonnet and bonnet-joint characteristics, materials. Crane Co.

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Bronze Gate Valves—Featured in this Product Bulletin 198 are bronze unit bonnet gate valves for 125-150 WSP. Dimensional data are included, as well as sectional view of valves showing component features. The Wm. Powell Co.

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Pressure Reducing Valve—Bulletin 561-C describes a diaphragm operated

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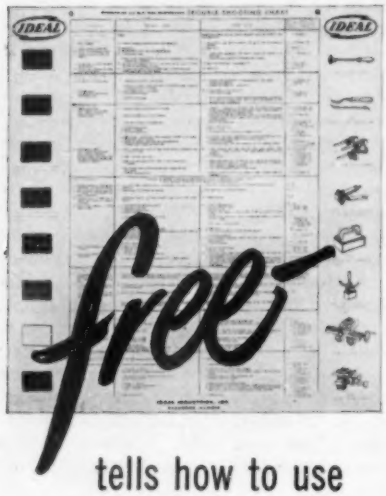

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(Begins on page 296)

pressure reducing valve for steam heat and process steam applications. Design advantages are detailed, and specifications, sizing and capacity data, and dimensions are included. Leslie Co.

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Where Space is Limited—Construction features and advantages of Quick-As-Wink Slim-Line valves for installations where mounting space is limited are detailed in 12-pp Bulletin 591. Diagrams showing operation of three- and four-way valves are included. Hunt Valve Co.

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Butterfly Valves—Bulletin 10 contains detailed selection information on a rubber seat butterfly valve designed to mount between pipe flanges. Contains tables of maximum valve line pressures for various cylinder operating pressures, water flow characteristics of butterfly valves. Henry Pratt Co.

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Butterfly Valves—Resilient-seated type butterfly valves for applications where positive tight closure is required are illustrated and described in Bulletin 590X. Advantages and outstanding features are detailed. W. S. Rockwell Co.

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Automatic Valve Actuator—Catalog V-200 describes the Valvmatic, a valve actuating unit designed for converting hand-operated valves to automatic operation. Advantages are detailed and a drawing shows design features. Photos illustrate installation. C. H. Wheeler Mfg. Co.

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Ductile Iron Traps—Bulletin SS-142B describes advantages of ductile iron steam traps which can be bent or twisted without breaking. List prices, dimensions and capacities are listed. Strong, Carlisle & Hammond.

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Steam Trap—Bulletin 257 describes features and operation of a steam trap which uses the kinetic energy of steam to close the valve. Operation details are illustrated and capacities tabulated. Sarco Co., Inc.

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On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation. Armstrong Machine Works.

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Piping Products—Use of this company's couplings, fittings and other piping products is described in 8-pp Form 259. Contains product information, installation instructions, specifications, illustrations of such ap-

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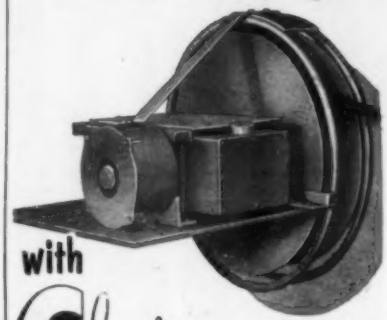

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plications as fuel and supply lines, materials handling piping, equipment piping, pump settings. Dresser Mfg. Div., Dresser Industries, Inc.

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Plastic Piping Equipment—Engineering of plastic piping systems equipment for corrosion service, including chemical resistance and physical properties charts with recommendations are discussed in this 16-pp Handbook 1159. What materials to specify, materials description, valves with dimensions, fittings, engineering data and a lubricant and sealer, are detailed. Chemtrol Co.

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Reinforced Plastic Pipe—Detailed information on characteristics and applications of reinforced plastic pipe is presented in the 16-pp Bondstrand Bulletin. Temperature and pressure curves are included, along with dimensions. Amercoat Corp.

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UPVC Pipe, Fittings—Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in 24-pp Booklet TTP-119. Also gives specifications for threaded and socket types of UPVC fittings, valves and flanges, or normal and high-impact material. Tube Turns Plastics, Inc.

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Lined Clay Pipe—Described in this illustrated brochure is a glass lined sewer pipe with built-in advantages. Performances and installation details are illustrated. American Vitrified Products Co.

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Sewer Structures—Structural and material advantages of corrugated sewer pipe are detailed in 44-pp Manual CMS-7458. Discusses structural durability of corrugated metal sewers, material durability, selection of structures, factors influencing capacity, joints and fittings, linings for failing sewers, installation data. Armco Drainage & Metal Products, Inc.

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Valved Couplings—Features and applications of company's valved couplings designed for instant shut-off are detailed in Bulletin H-1686. Covers couplings for high pressure, vacuum and very low pressure, for impact air lines and for hard to handle fluids. Snap-Tite Inc.

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Expansion Joints—Twelve-pp Bulletin EJ-1917 describes advantages of company's Gun-Pakt expansion joints with either welding or flanged ends. Section on figuring expansion of pipe lines, expansion joint installation suggestions, and complete specifications included. Yarnall-Waring Co.

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Swivel Joint—Features and advantages of company's swivel joint which permits fast, easy packing interchangeability are illustrated and described in Bulletin 1258A. Table of specifications and properties are included. Chiksan Co.

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LUBRICANTS, LUBRICATION

Organized Lubrication—Benefits of organized lubrication—major cost control factors are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority are covered. Texaco, Inc.

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Lithium Base Grease—Featured in this 12-pp booklet is a multi-purpose lithium base grease designed to do the work of many. Characteristics of the grease under different types of industrial conditions are described. Gulf Oil Corp.

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Product Guide—This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petro-chemicals, spray oils, solvents, others, Sun Oil Co.

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BOILERS, BURNERS

Hot Water Boilers—Catalog HCC-2, 20-pp describes and illustrates design, construction advantages and economies of company's controlled circulation hot water boiler for supplying high pressure, high temperature water

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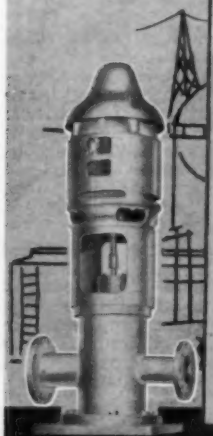
VERTICAL TURBINE PUMPS



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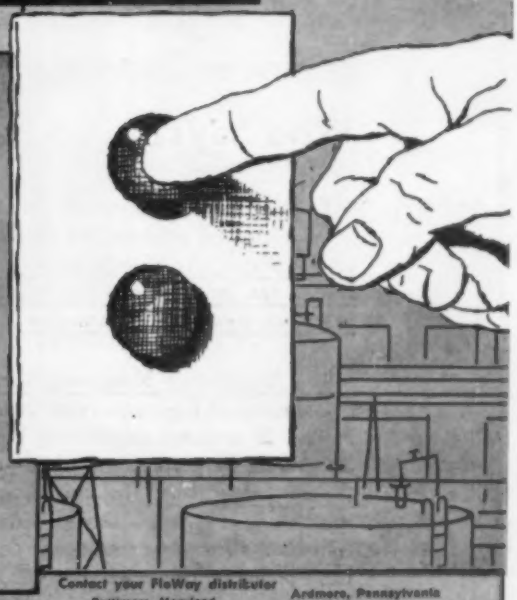

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Don't take chances on couplings

CHECK PUBLISHED MISALIGNMENT RATINGS BEFORE YOU BUY

Since misalignment is the basic problem that shaft couplings are designed to solve you'll find a published conservative misalignment rating (along with load capacity rating) for every Fast's Coupling. Compare it with the misalignment rating of any other coupling you are considering.
One further advantage of Fast's Couplings' misalignment ratings: You save money on installation because, knowing the ratings, you don't have to line up driving and driven elements with pinpoint accuracy. It's one more important reason why Fast's Couplings are the choice of more equipment manufacturers than any other gear-type coupling.
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KOPPERS **FAST'S COUPLINGS**
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One of a series

Engineer Shortage? — Who Says?

From time to time statements are issued and news stories are published on either the shortage or over-supply of engineers. Some of these stories can be startling. Too often they are based on insufficient information.

The Engineering Manpower Commission—a committee of Engineers Joint Council, representing 20 national engineering societies and 300,000 of the nation's engineers—always has the up-to-date facts. For figures, such as the number of engineers needed, freshman enrollments, number of graduates, current salaries—phone, wire or write—

ENGINEERS JOINT COUNCIL

Engineers Joint Council
29 West 39th St., N. Y. 18, N. Y.
For information, call Pennsylvania 6-9220

DATA FILE

(Begins on page 296)

for heating systems and process use. Combustion Engineering, Inc.

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Packaged Boilers—Design features and advantages of company's packaged boilers for heating or processing are detailed in 8-pp Form AD 137. Ratings and dimensions tables are included, as well as specifications and boiler room layout diagram. Cleaver-Brooks Co.

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Boiler Construction—Bulletin BE100 describes advantages of practical boiler construction with 2 pass design, featuring comparable results with equal heating surface, but with Continental's two-pass features—turbulent spinning gas technique-uniform heating, no refractory baffles and symmetry of furnace layout. Boiler Engineering & Supply Co.

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Generators, Auxiliaries—20-pp Catalog SB 60, on steam generators and allied equipment, provides cross section views of major products to show design and construction. Standard and special boilers are included, also burners, Erie City Iron Works.

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Steam Generators—Advantages of company's steam generators designed to adjust to actual production needs are detailed in this 6-pp Product Bulletin C-731. Schematic diagram showing operating details is included. Clayton Mfg. Co.

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Steam Atomization—Bulletin 1252 contains detailed information on a steam-atomizing burner system designed for burning low-cost heavy oils. Advantages are explained and operation of unit described. Orr & Sembower, Inc.

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Fuel Burning Equipment—Comprehensive Catalog 6260 covers oil burners, gas burners, dual-fuel burners for gas and oil, forced draft package units, boiler-burners units, coal stokers, combustion control panels and the SelecTemp steam heating system. One section discusses selection of fuel. Iron Fireman Mfg. Co.

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Heavy Oil Burners—Illustrated and described in 8-pp Bulletin 1 is a line of oil burners engineered to make use of low-cost, high-heat content heavy fuel oils. Advantages and typical applications detailed. Industrial Combustion Inc.

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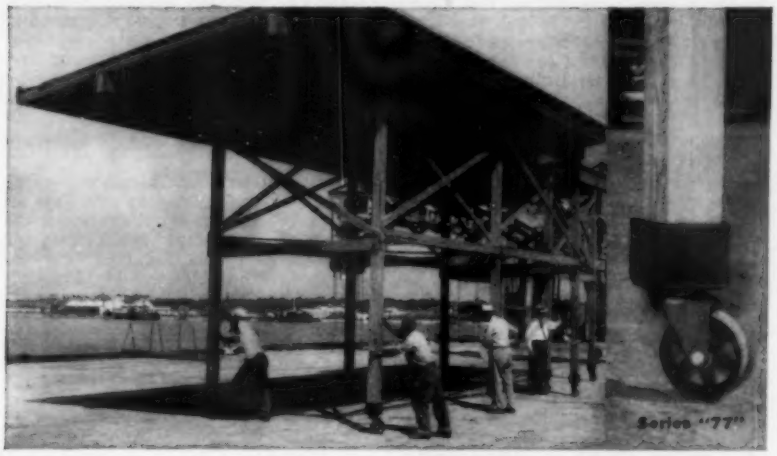
WATER TREATING

Consulting Service—Advantages of company's consulting service are detailed in 8-pp Bulletin 5006-A. How the service is qualified to solve problems concerning scale and corrosion control in boilers, cooling systems,

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS



Rolling roof aids all-weather shipments

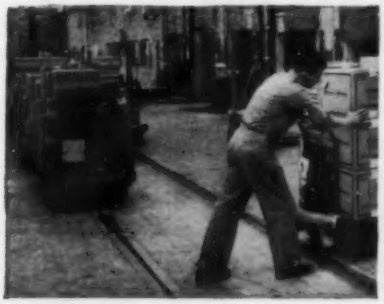
As one of their steps to build up shipping and enlarge port operations, Gulfport Port Commission, Gulfport, Miss., devised these novel movable sheds. They allow dry unloading of banana boats even in the heaviest of rainstorms.

The sheds roll quickly and easily into position on Bassick medium-duty "77" and heavy-duty "HA" series casters with 8-inch forged-steel wheels. And they roll away just as easily when no longer needed.

Whether your caster application is as novel as this or not, chances are there's a Bassick caster that's just right for the job. Why not check your Bassick distributor?

Mile of towline moves here on "Bassicks"

Here's just a small part of the materials-handling set-up at the ultra-modern North Brunswick, N. J., plant of Johnson & Johnson. The famous makers of BAND-AID Adhesive Bandages, and a variety of other first-aid and medical products solve materials-handling problems with carefully planned towlines, totaling more than a mile in length. On each towline truck, easy-rolling, easy swiveling Bassick Series "S99" casters, in front, and Bassick "Alcore" wheels, at rear, insure maximum life with minimum maintenance.



Easy rolling press roll

Gentle handling is what this rotogravure cylinder gets—on its way to the printing presses of one of the country's largest high-speed printers.

Bassick Floating Hub casters (inset), on the special dolly used for handling the cylinder, absorb shocks, protect floors, and make for easy movement over obstacles.

Illustration courtesy of "The Chronicle" of the Early American Industries Association.

Early baby walker on casters

Even babies used casters in early America, as this antique baby stroller shows. It has four casters (not Bassicks) and tip-proof design. Casters have grown a lot since those infant days. Today, there's a caster to move practically anything.

Massive test stand ...mobile electronics

The rigidity of a concrete emplacement is necessary for this fantastically precise gyro test-stand at Ford Instrument Co., Division of Sperry Rand Corporation, makers of guidance systems for some of our most famous missiles. But note the ready mobility of the electronic rack at right. Bassick casters allow smooth, easy motion to any location desired.

See your distributor who handles Bassick casters. He can help you select the right caster from hundreds of types, and has many of them in stock. 0.34

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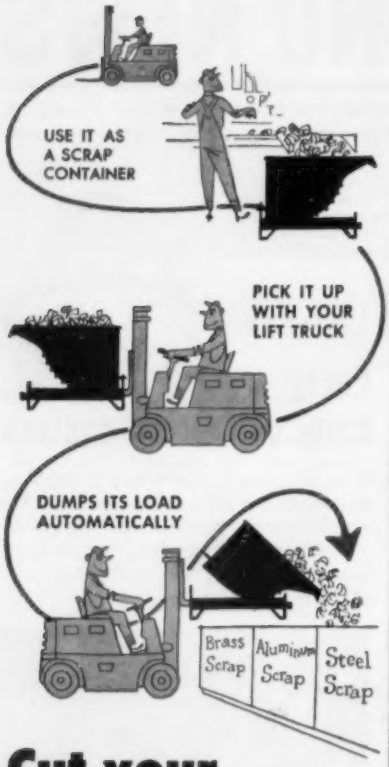

Cut your scrap-handling costs 50%

Handling scrap metal is a simple, one-man operation when you use Roura Self-Dumping Hoppers. Place them in strategic spots for scrap collection. One man with a lift truck carries them to scrap bins or freight car . . . flips the latch and the hopper automatically dumps its load, rights itself, locks itself, and it is ready for another load. Hoppers may be labelled for different kinds of scrap for easy, profitable scrap segregation. No wonder they're cutting costs in hundreds of plants.

Forks or platform of any standard lift truck slip easily into under-frame of a Roura Hopper. Pick-up is swift and simple. Made in 8 sizes from ½ to 4 yard capacities and mounted on live or semi-live skids with choice of wheels.

They're made of 3/16" steel plate with continuous arc-welded seams. Heavier plate if desired. Standard models shipped from stock immediately. Also available in stainless steel and galvanized.

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DATA FILE

(Begins on page 296)

and process waters is discussed. Dearborn Chemical Co.

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Demineralization Process—Bulletin 5819 describes Uni-Pac, a packaged mixed bed demineralizer for process water applications ranging up to 13,200 gph. Information on use of process eliminating variables in water and effects on product quality control given. Cochrane Corp.

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MECHANICAL POWER TRANSMISSION

Power Transmission Products—Catalog 759 contains 104-pp of engineering data, specifications and prices on roller chain, sprockets, couplings and conveyor chain. Data includes material on selection of roller chain drives, speed ratios for sprocket combinations, chain length tables, illustrations of various standard attachments. Diamond Chain Co., Inc.

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Motors and Drives—Eight-pp Bulletin 2650 describes company's line of a-c and d-c standard motors, special motors, gear motors and adjustable speed drives, for a broad range of industrial applications. Summarizes characteristics and modifications for 20 basic types of motors and drives. The Louis Allis Co.

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Belting, Other Rubber Products—Illustrated and described in 40-pp Bulletin BHM-10 is a line of industrial rubber products, including V-belts and sheaves, V-belting and flat belts, hose and couplings, rubber lined products, and molded rubber goods. Includes dimensional tables, hose selector guide, descriptive data. The Gates Rubber Co.

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Anti-Friction Bearings—Catalog 424-B covering "the broadest line in the anti-friction field," is an 8-pp folder giving capsule presentation of company's entire product line. A brief description of each product is provided. SKF Industries, Inc.

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Spring Clutches—Described in this 30-pp catalog are five standard lines of spring clutches in bore sizes from ⅛ to 1 in., torque capacity to 1250 lb-in., for use in applications utilizing drive up to 5 hp. Clutches offered include over-running and back-stopping; indexing; on-off; on-off indexing; and safety lock control. Marquette Div., Curtiss-Wright Corp.

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More Flexible Couplings—An expanded line of Para-flex cushion couplings, from fractional to 190 hp per 100 rpm, is described in 12-pp Bulletin A669C. Of two new sizes included in the line is one capable of delivering 2000 hp at 1080 rpm. Photos, drawing and text explain design features and operating characteristics of Para-flex. Detailed tables of horsepower, ratings, prices, sizes provided. Dodge Mfg. Corp.

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Flexible Couplings—Comprehensive selection data on flexible couplings is presented in 48-pp Engineering Catalog 60. Misalignment is described and basic coupling arrangements and load classifications are included, along with photos of couplings, etc. Thomas Flexible Coupling Co.

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Coupling Data—An integrated selection of product bulletins and data on company's line of couplings for a variety of industrial applications is presented in this handy ringbound notebook. The notebook contains sections on product literature, engineering data, instruction sheets, application data, and price lists. To all of these sections, additional material can be added as it becomes available. Koppers Co., Inc.

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SLINGS, CHAINS, WIRE ROPE AND FITTINGS

Wire Rope Advantages—Advantages and economies of company's wire rope all purposes are detailed in this products bulletin. Various types and constructions are covered and strength and weight charts included. Leschen Wire Rope Div., H. K. Porter Co., Inc.

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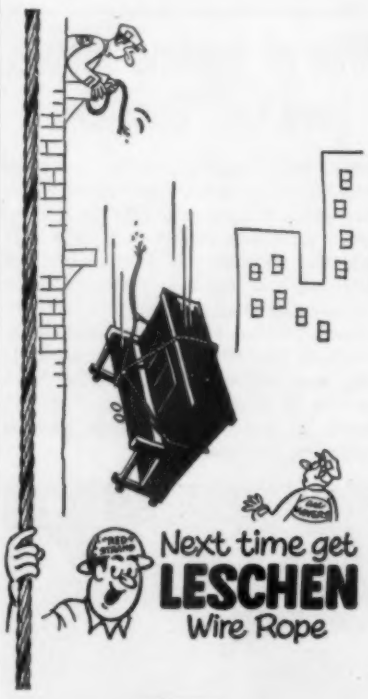

LESCHEN WIRE PORTER ROPE DIVISION
H. K. PORTER COMPANY, INC.

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Sling Chain Handbook—Illustrated Data Book 100, 32-pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of the sling chains. Columbus McKinnon Corp.

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To Survey Sling Chain—How a chain survey can be used to assure safe,, dependable sling chain assemblies and reduce overall cost of material handling operations is explained in this 8-pp booklet. Tells how a sling chain survey is conducted. Campbell Chain Co.

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Sling Handbook—Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fittings. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. Union Wire Rope Corp.

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Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Crosby-Laughlin Div., American Hoist and Derrick Co.

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Aluminum Coated Wires—Described in 6-pp Folder DH-537B are aluminized steel wire and wire products, including steel core wires, steel strand guy wire, overhead ground wire, toe wire, messenger wire, telephone wire, chain link fabric and barbed wire. Properties and applications listed. Page Steel & Wire Div., American Chain & Cable Co., Inc.

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MATERIALS HANDLING

Conveyor System—Construction and operating features of company's Power-Flex and free conveyor system for industry-wide application are illustrated and described in 6-pp Bulletin 159. Advantages are detailed and general specifications given. Conveyor Div., Columbus McKinnon Corp.

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Screw Conveyors—Comprehensive information on applications and selection of screw conveyors, screw feeders, and components is presented in 78-pp Book 2989. Contains descriptive sections on screw conveyors and their uses, types of components, engineering of screw conveyors, screw feeders, components. Lists materials for which conveyors may be used. Link-Belt Co.

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Countersinking Belt Fasteners—Bulletin F-115 describes a method of countersinking fasteners in heavy conveyor belt covers. Various types of countersinking tools are illustrated. Flexible Steel Lacing Co.

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Vertical Transportation—Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various types of elevators and escalators for a variety of commercial and industrial applications are described. Otis Elevator Co.

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Electric Hoists—Performance details on company's heavy-duty electric hoists with improved gearing system are presented in this product bulletin. Cutaway view showing internal features is included, as well as specifications table. Coffing Hoist Div., Duff-Norton Co.

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Electric Hoists—Twelve-pp Bulletin DH 133D describes Speedway electric hoists of 500-to 4000-lb capacities. Fully illustrates and explains design features and gives details on supensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co.,, Inc.

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Electric Hoists—Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectionals. Hoist & Crane Div., Robbins & Myers, Inc.

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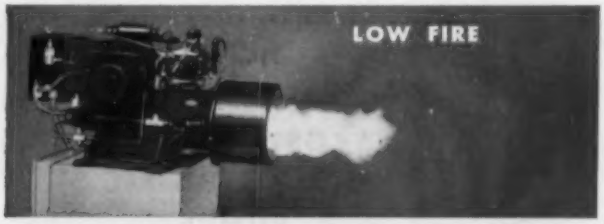
Cost-Cutting Materials Handling—"The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet cover-

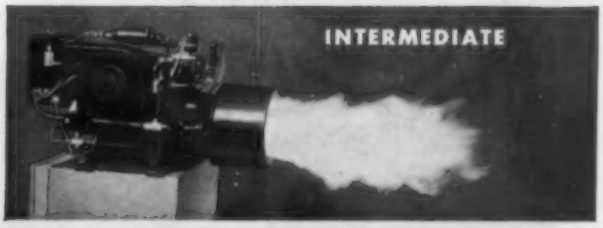
Burner does a slow burn

for smooth, economical operation

HEV-E-OIL BURNERS start with a low fire, a small flame which gradually builds up to the required size for safe, smooth operation. Low fire and high fire are controlled exactly to assure top efficiency over the entire firing range. Moreover, Hev-E-Oil burners furnish all the primary and secondary air needed for efficient combustion. Available from 5 to 150 gph. Also combination gas/oil burners from 720,000 to 21,000,000 Btu.

HEV-E-DUTY POWER GAS BURNERS also utilize slow fire build-up for top performance. Air is metered in correct proportion to the amount of gas being used, resulting in high efficiency regardless of chimney draft caused by outside weather conditions. Sizes from 720,000 to 21,000,000 Btu. For more information on Hev-E-Duty Power Gas, Hev-E-Oil and combination burners, write Dept. PE-90.





INDUSTRIAL COMBUSTION INC.

EXECUTIVE OFFICE: 4507 N. OAKLAND AVENUE
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DATA FILE

(Begins on page 296)

ing various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices. The Yale & Towne Mfg. Co.

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Industrial Casters—Catalog 159 contains 24-pp of illustrations, descriptions and specification data on swivel-plate and rigid-plate truck casters for industrial applications. Includes detailed information on spring-action casters, V-groved casters, grease-sealed casters, scaffold casters, floor truck locks, industrial wheels, and others. Faultless Caster Corp.

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Caster, Wheel Manual—Featured in 192-pp Manual 65 is comprehensive information on company's complete line of casters, wheels, glides, desk shoes and accessories. Illustrated with photos and dimensional drawings and diagrams of the various types of casters, and wheels for a variety of applications, manual contains tabulated engineering data. Darnell Corp.

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Self-Dumping Hoppers—Cost-saving advantages of self-dumping steel hoppers for bulk material handling are detailed in Bulletin 265. Photos showing typical handling applications are included. Roura Iron Works, Inc.

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STORAGE, SHOP EQUIPMENT

Guide to Shelving—To assist plant engineers in selecting proper shelving for all storage requirements. 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts. Storage cabinets are also described and instructions included for planning of stockrooms. Deluxe Metal Products Co., Royal Metal Mfg. Co.

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Storage Equipment—Reference Manual 487 contains 64-pp of descriptive data on a line of steel storage equipment, including shelving, bins, doors, slotted angle, drawer units, lockers, benches, grating, counters, and other items. Assembly details and dimensional data included. Equipto.

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Steel Equipment—Catalog 100 H contains 92-pp of detailed information on steel cabinets, folding chairs, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and specifications. Lyon Metal Products, Inc.

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Flexible Steel Shelving—Advantages of Erectomatic steel shelving are illustrated and described in 8-pp Form 2451-D. Various types of shelving available are shown and dimensional data given. Columbia-Hallowell Div., Standard Pressed Steel Co.

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MAINTENANCE

Corrosion Control Systems—This booklet is designed as a guide to primary protection and preventive maintenance of all metal surfaces subjected to chemical attack of acids and alkalis, fumes and gases, active industrial solvents and severe industrial weathering. Principal protective systems are described and properties and uses, primer coats and finish coats listed. Truscon Laboratories, Devoe & Raynolds Co., Inc.

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Coating Systems—Described in this 16-pp bulletin are a number of protective maintenance coating systems designed to solve a variety of corrosion problems. Index tab indicates where a particular system should be applied, and copy explains features of each system, suggests uses, mentions colors. The Glidden Co.

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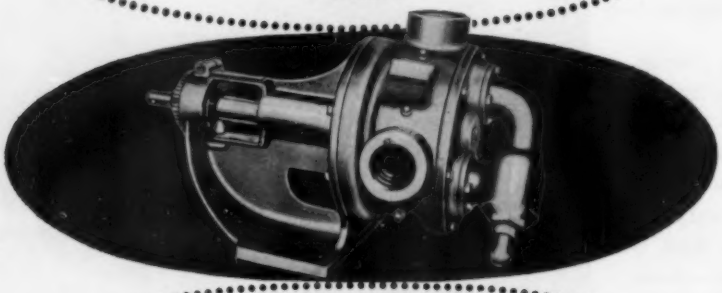
Planned Maintenance—Data Sheet SD-5925-A covers basic requirements for architectural planning to assure better industrial and institutional housekeeping. Covers avoidance of unnecessary dust catching surfaces, cleaning of new facilities before occupancy, construction of walls and

NOW!

MORE PUMPING CAPACITY AT LESS COST • WITH VIKING'S STAINLESS STEEL PUMPS



You get more pumping capacity from these new Viking heavy duty stainless steel* pumps because they can be operated up to 100% rated speed. By increasing the speed of a Viking pump its capacity is increased correspondingly. Upwards of $300 to $400 can be saved on some pumping applications. ■ Entirely new, modern foundry facilities and manufacturing processes enable the complete line of Viking alloy pumps to meet more exacting requirements than ever before and at higher speeds. ■ If your specifications call for stainless steel or other alloy pumps, see how you, too, can save on the new line of full speed Viking alloy pumps.

*Also Steel, Monel, Nickel, Ni-Resist, Ductile Iron, Other Alloys

For Complete Information, Write For Catalog 42

VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. In Canada, It's "ROTO-KING" Pumps

See Our Catalog in Sweet's Plant Engineer's File

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Fine tools that encourage Good Work

ARMSTRONG WRENCHES

An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types—single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

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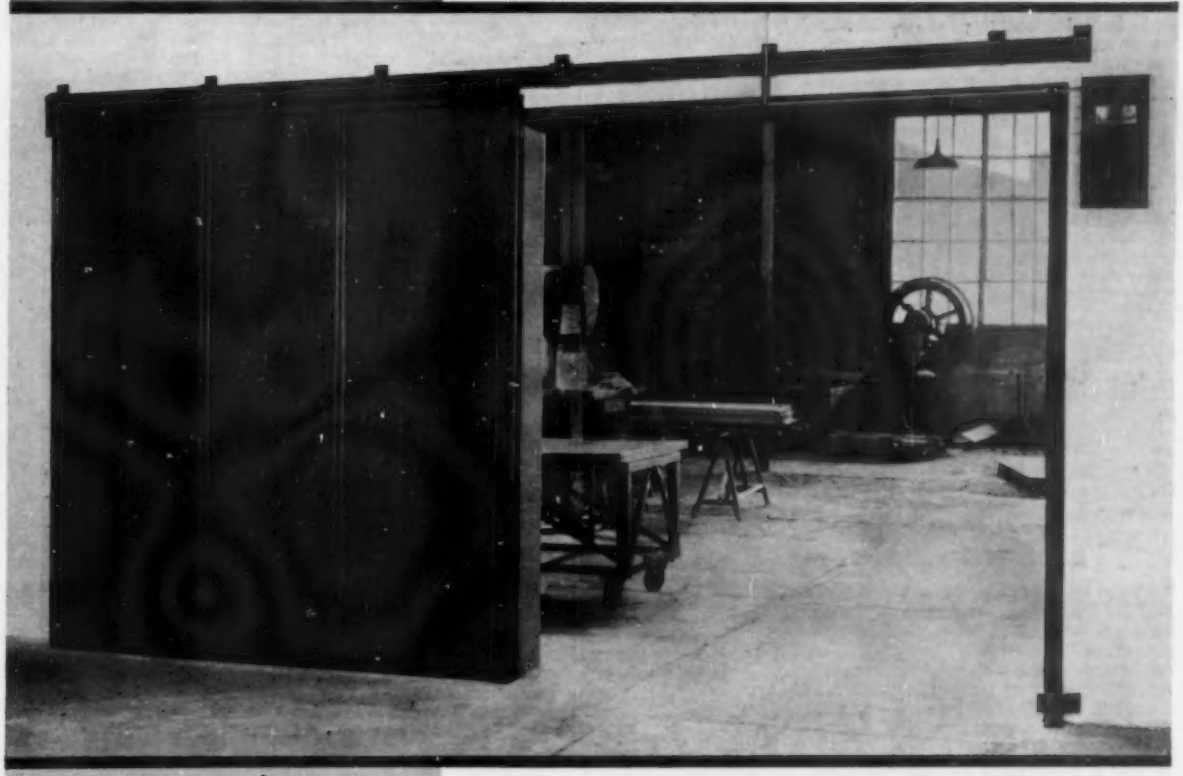
NEW UTILITY • NEW APPEARANCE!



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Available also with "B"-1 ½ HR and "C"-¾ HR Labels

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49 LAKE STREET — *Over 50 Years Manufacturing Fireproof Doors and Metal Trim* — **LE ROY, NEW YORK**

For more facts circle 706 on Reply Card

DATA FILE

(Begins on page 296)

corridors, design and construction of custodial storage facilities. Puritan Chemical Co.

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Floor Maintenance —Many types of industrial floors are studied and their soil removal problem analyzed in this 8-pp booklet, complete with charts, list of cleaning compounds, and descriptions of cleaning methods. Methods of sanitizing, stripping wax and paint, and of absorbing liquids told. Oakite Products, Inc.

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Vacuum Cleaners—Bulletin 34, 8 pp, describes heavy-duty vacuum cleaners for industrial, commercial and other uses. Specifications, construction features, and illustrations are included. A furnace cleaner is also covered. The Black & Decker Mfg. Co.

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Pyramid Ladders—Catalog 158, 20-pp, describes a line of pyramid-design step ladders, as well as hydraulic lifts and fixed or adjustable-level work platforms for above-floor working safety. Illustrates 35 new models of ladders for working heights up to 15 ft. Ballymore Co.

▲ For a copy, circle 436 on Post Card

HOSE, FITTINGS

Improved Pressure Hose—Form NEPR-500, 24-pp, describes Hytron hose and couplings. A section on engineering facts on this hose covers its advantages, applications, limitations. Booklet also gives tips on installation, chemical resistance tables, temperature and pressure ranges. The Imperial Brass Mfg. Co.

▲ For a copy, circle 437 on Post Card

Teflon Hose Assembly—Advantages of company's Springfield 120 Teflon hose assembly are detailed in this illustrated bulletin. Assembly procedure is pictured and described and design specifications tabulated. Titeflex, Inc.

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Flexible Metal Hose—Featured in 8-pp Catalog 188 is a line of flexible metal hose, as well as rubber and synthetic hose. Detailed specifications and dimensions given. Flexonics Corp.

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Tube Fittings and Hose—Comprehensive data on brass and steel tube fittings, tube working tools, hose, hose ends and assemblies most frequently used in hydraulic and pneumatic systems is presented in 16-pp Catalog C-301. The Weatherhead Co.

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All-Purpose Hose—Illustrated and described in Bulletin A-5157K is an all-purpose hose designed for air, oil, gasoline, chemicals and water applications. Advantages and economies of this hose are detailed. Goodyear Tire a Rubber Co.

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INSTRUMENTS, CONTROLS

Automatic Controls—Selection and application information on a line of automatic controls for steam and water service is presented in this 46-pp Engineer's Manual. Covers controls for fuel oil heaters, heat exchangers for cooling, instantaneous heat exchangers, jacket water cooling, process hot water, pressure reducing. The Powers Regulator Co.

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Controls for Automation—Automation Controls Catalog, 44-pp, groups together a wide selection of automatic controls most commonly used in designing automatic systems. Includes such items as counting devices, switches, electric valves, actuators, relays, limit controls, time switches and accessory equipment which can be used as building blocks in selecting components for tailoring system. General Controls Co.

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Control Panels—Selection of the right control panel for a wide variety of automatic materials handling systems is the subject of 12-pp Bulletin G-9. Four basic types, the "walk-in" master control panel, the floor and wall-mounted types, and the explosion-proof type are illustrated and described. Fuller Co.

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Indicating Flow Meters—This catalog combines all basic information on company's flow meters, flow switches, and manometers. Covers material composition of components, design characteristics, mounting methods, scales, maximum application temperatures and pressures, direction of flow, pipe connection locations, and other data necessary for installation and operation of flow meters. Seico Instrument Div., Eclipse Fuel Engineering Co.

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Stroboscope Data—Applications of the electronic stroboscope are illustrated and described in 8-pp Form 766-D. Includes complete descriptive and specification data on the Strobotac—a small, portable stroboscope tachometer—as well as on the Strobolux, the Strobolume and the Microflash. General Radio Co.

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Malfunction Detector—Technical Bulletin RF-586 describes a malfunction detector designed to provide maximum protection for large motors, pumps, compressors and other rotating equipment by responding to mechanical malfunctions the instant they occur. Specifications are included, as well as diagrams and dimensional data. Aeronautical and Instrument Div., Robertshaw-Fulton Controls Co.

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Tank Contents Gaging—Bulletin 463A describes a line of remote and direct reading tank contents gaging systems, including hydrostatic, hydraulic and direct reading gages. Details on operation are illustrated. The Liquidometer Corp.

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DUST, FUME CONTROL

Dust Collectors—Self-contained cabinet cloth-filter type dust collectors are illustrated and described in this 6-pp Bulletin 359. Design details included. Torit Mfg. Co.

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Cloth Dust Collector—Advantages and features of company's cloth dust collector which imparts a centrifugal action to dust entering collector and reduces loading of the cloth are detailed in Bulletin 10-27-59. Sectional view showing operating principles is included, as well as dimensional data and specifications. Dustex Corp.

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FANS, VENTILATING AND AIR CONDITIONING

Propeller Fans—Detailed information on a line of propeller fans and accessories is presented in 20-pp Bulletin A-109E. Dimensional tables, ratings for single, two-propeller and multiblade fans are included. Hartzell Propeller Fan Co.

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Belt-Driven Fans—Bulletin 3401 is a 20-pp detailed selection guide covering company's belt-driven Util-A-Sets with backward blade and forward curved wheel. Engineering data includes capacity tables, dimensional drawings, sample fan specifications and other information needed for ventilation installations. Ilg Electric Ventilating Co.

▲ For a copy, circle 452 on Post Card

Ready Units—Catalog 517 provides 36-pp on complete, ready-to-run centrifugal fan equipment. Capacities 400 to 13,000 cfm, belt and direct driven units. Dimensions included. Clarage Fan Co.

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Air Moving Equipment—Bulletin DB 45-58, 20-pp, contains detailed information on company's line of roof ventilators, bifurcators, axial flow vent sets, and air jets. Bonded performance ratings are listed on tables, and dimensional data included. De-Bothezat Fans Div., American Machine and Metals, Inc.

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Air Conditioning Units—Bulletin 786 contains 54-pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing physical size based on air capacity and face velocity requirements. Succeeding pages concern themselves with heating and cooling requirements. American Air Filter Co., Inc.

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Zone Control Cabinets—Air conditioning zone control cabinets are described and illustrated in 20-pp Bulletin AC-220. Separate sections with tables, curves and sketches cover proper unit selection, physical data, dimensions, fan performance and coil ratings. Buffalo Forge Co.

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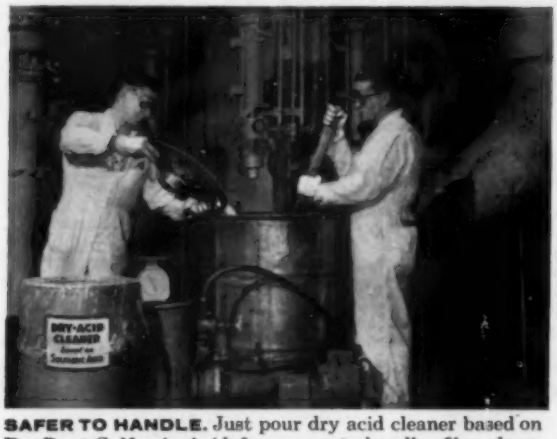
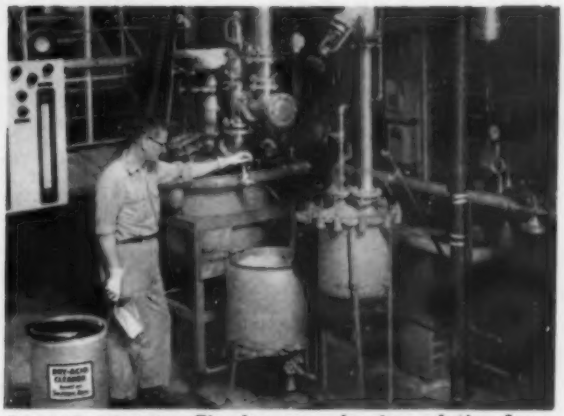
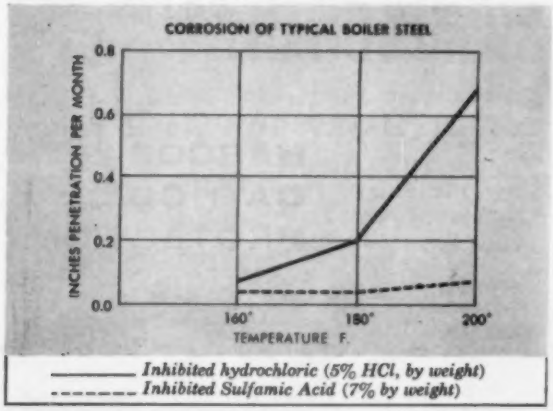
Descale boilers, heat exchangers, condensers rapidly, thoroughly with safer **dry acid** cleaners based on **Du Pont Sulfamic Acid**



SAFER TO HANDLE. Just pour dry acid cleaner based on Du Pont Sulfamic Acid from easy-to-handle, fiber drum into make-up tank. No danger from broken bottles, liquid spillage or corrosive fumes with these dry powders.



EASIER TO USE. Simply pump cleaning solution from make-up tank into boiler. Often dry acid cleaners can be added directly to equipment being cleaned. No elaborate equipment or specially trained labor needed.



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For more facts circle 707 on Reply Card

DATA FILE

(Begins on page 296)

HEATERS, HEATING

Infra-Red Heaters—Bulletin CS-305 gives specifications, operating costs and typical applications for three portable gas-fired infra-red heaters. Describes principles and advantages of heaters that heat the workman and his tools but not the air. Perfection Div., Hupp Corp.

For a copy, circle 457 on Post Card

Direct-Fired Heaters—Gas-fired heaters, furnaces and packaged blowers are described in detail in 28-pp Catalog SA-5900. An illustrated table of contents enables selecting heaters and furnaces according to type, applications, capacities, and major features. Sections of book cover fan-type and blower-type unit heaters, five-way air-flow heaters, heavy duty units, furnaces, etc. Reznor Mfg. Co.

For a copy, circle 458 on Post Card

Electric Heating Units—How to solve winter problems with electric heat is told in 16-pp Bulletin F-1575A. Applications of electric heating units in a variety of different jobs are illustrated. Edwin L. Wiegand Co.

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Gas-Fired Unit Heaters—Bulletin GU 660 describes features and advantages of gas-fired unit heaters with faster heating and positive heat penetration. Cutaway view showing component details is included along with specifications. Modine Mfg. Co.

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Space Heaters—Counterflo heaters, designed to deliver maximum Btu output to air at the point of use, are described in Bulletin 580, 6 pp. Engineering data given. Dravo Corp.

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Heating, Air Conditioning—Featured in 20-pp Bulletin B-151A is company's line of air conditioning and heating equipment. Illustrated and described are air conditioning units, convector radiators, perimeter heating, hot water heating equipment, heating system controls, and unit heaters. Dimensions, and ratings are included Warren Webster & Co.

For a copy, circle 462 on Post Card

Hot Water System—How to provide hot water for the variety of requirements of an industrial plant without stretching the hot water system too far is the problem covered in this series of ring-bound bulletins. Various types of water heaters for commercial and industrial applications are illustrated. A. O. Smith Corp.

For a copy, circle 463 on Post Card

SAFETY, FIRE PROTECTION

Fire-Resistant Fluids—This series of specification sheets describes company's line of fire-resistant fluids including synthetic, oil-water emulsion and glycol types. Physical characteristics given Mobil Oil Co., Inc.

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Fire-Resistant Resin—Structural panels, skylight louvers, chemical ductwork and other products made of Hetron, permanently flame-resistant polyester resin are covered in this illustrated bulletin. Table lists characteristics. Durez Plastics Div., Hooker Electrochemical Co.

For a copy, circle 465 on Post Card

Postage-free cards for ordering catalogs are on page 292. You may also use the cards to order literature mentioned in the ads.

Special Fire Protection—Devoted to special fire protection, this 44-pp booklet covers both equipment and methods. Tells how to recognize special fire-hazards conditions in a plant. Discusses in detail major types of fire protection, telling how each functions, giving it advantages and limitations, and illustrating some examples of successful use. Grinnell Co., Inc.

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Fire Alarm Systems—Publication 246 contains 36-pp of detailed information on fire alarm systems for critical applications in industrial, institutional and other public buildings. Contains typical job specifications. The Standard Electric Time Co.

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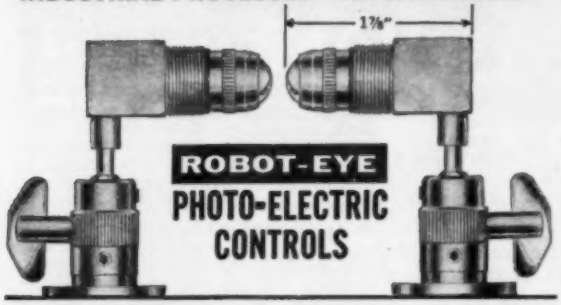

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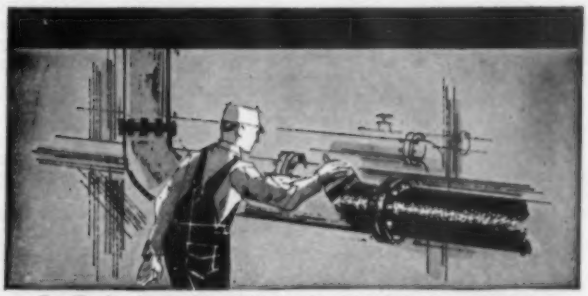

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DATA FILE

(Begins on page 296)

OTHER EQUIPMENT

Industrial Stack—Detailed information on a permanent, low cost refractory smoke stack for commercial and industrial applications is contained in 8-pp Bulletin IS-32. Gives product information, applications with boilers, furnaces, etc. VanPacker Co., Div., The Flintkote Co.

For a copy, circle 468 on Post Card

Elastomer Coated Fabrics—Detailed information on synthetic elastomer coated fabrics is presented in this 12-pp bulletin. Physical properties and tests of the various synethic fabrics, uses, specifications are covered. E. I. du Pont de Nemours & Co., Inc.

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For Cleaner Furnace—The use and application of Oxi Crystals to keep furnaces and the fireside of boilers free of slag, encrusted carbon, soot and fire-scale is described in a recent pamphlet. Oxi-Kor Corp.

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Product Guide—This 26-pp booklet is designed to show the wide range of products manufactured by the Company. It contains an alphabetical listing of the products, with reference to engineering literature available. Allis-Chalmers Mfg. Co.

For a copy, circle 471 on Post Card

Industrial Cooling Towers—Design and construction features of company's industrial cooling towers utilizing the cross-flow principle are detailed in Bulletin G-60. Also describes double-flow towers. The Marley Co.

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Industrial Equipment—Featured in this 5-pp Bulletin is a line of equipment manufactured by this company, including such items as air release, can filters, capacitors, circulating lubrication systems, rate of flow controllers, dispensing outfits, filters, indicators, lubricating units, meters, oilers, pumps, valves. Bowser, Inc.

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Hydraulic Equipment—Detailed information on company's line of fluid power equipment is presented in Catalog 200, including hydraulic power units, hydraulic cylinders, hydraulic control valves, and solenoid operated, pilot operated hydraulic control valves. Mechanical and operating features are illustrated and described. Logansport Machine Co., Inc.

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After Cooler—Features and applications of company's after cooler for reducing compressed air temperatures are detailed in 8-pp Bulletin 130. Cutaway diagram illustrates operation details. Niagara Blower Co.

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Automatic Air Products—Featured in 22-pp Bulletin 157 are automatic air products, including separators, afterdriers, filtrators, filters, line drains, governors and kits, combinations, regulators, and lubricators. Advantages are detailed and operation described. Wilkerson Corp.

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Aluminum Alloy Anode—Bulletin TP-115-E describes HP-4, an aluminum alloy galvanic anode for protection of tanks against sea water. Details lower amp-hour cost and other benefits afforded and compares electro-chemical properties of HP-4 with zinc and magnesium. Electro-Rust-Proofing Co.

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All Steel Reels—Featured in 40-pp Catalog C-2 is a line of all steel reels, including air hose reels, belt reels, communication reels, hand-operated reels, instrumentation reels, lifting cables and cords, motor driven reels, spring-operated reels, and accessory equipment. Includes application suggestions, motor current tables, stretching, lifting and retrieving capacities, dimensional data. Gleason Reel Corp.

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Pivoted Blade Shears—Detailed information on Steelweld shears with pivoted blade design is presented in 16-pp Form 2011-H. Cutaway views showing component details are included, along with performance data, clearance dimensions and specifications. The Cleveland Crane & Engineering Co.

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High-Silicon Anodes—Advantages of high silicon cast iron anodes for ca-

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DATA FILE

(Begins on page 296)

thodic protection of steel water tanks are detailed in Publication TP-113-E-1. Various types of anodes for cathodic protection are described. Electro Rust-Proofing Corp.

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Activated Charcoal Purification—Pur-air adsorber cells and circulating units and filters used in air purification by activated charcoal are described and illustrated in this Bulletin T-264, along with dimensions, ratings and capacities. Also touches upon reactivation service available. Barnebey-Cheney Co.

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New Approach to Leveling—Components and operation of an optical leveling kit are illustrated and described in this 8-pp bulletin. Contains data on industrial alignment problems and solutions, including foundation or bed leveling, profiling, differential leveling and checking movement. Keuffel & Esser Co.

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Aluminum and Steel Data—Comprehensive selection data on aluminum and steel available in stock for almost every application is presented in this 242-pp buying guide. Necessary weights, dimensions and descriptive data are tabulated. Individual sections cover structural shapes, construction products, plates, sheets, hot rolled bars, cold finish bars, alloy and tool steel, tubing, stainless steel, aluminum, others. Joseph T. Ryerson & Son Inc.

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Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels effectively. Air Preheater Corp.

▲ For a copy, circle 485 on Post Card

Cathodic Protection System—Causes of corrosion and principles of cathodic protection are detailed in this 12-pp bulletin. Covers cathodic protection for pipe lines, water works equipment. The Harco Corp.

▲ For a copy, circle 486 on Post Card

Drain, Supply Line Cleaner—Described in Bulletin 658Du is a drain and supply line cleaner featuring a lightweight aluminum alloy housing. Features and advantages are illustrated and described. Kollmann Mfg. Co.

▲ For a copy, circle 487 on Post Card

Water-Cooled Stoker—Design and operating advantages of the Vibragrate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Div., United Industrial Corp.

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Chain Link Fence—Catalog F-915, 64-pp, contains illustrated information on company's line of chain link fences of aluminum or steel for a variety of industrial, commercial and other applications. Detailed specifications and dimensional data are included, also photos of installations. The Colorado Fuel and Iron Corp.

▲ For a copy, circle 489 on Post Card

On Wire Cloth—"Which Inco Nickel Alloy Can Solve Your Wire Cloth Problem?" 16 pp, cites 23 case histories showing where use of Inco nickel alloys in wire cloth improved service at lowered cost. Lists standard weaves, more than 150 chemicals filtered with it, mechanical properties, physical constants. Buyer's guide of established weavers included. The International Nickel Co., Inc.

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Glass-Bag Filters—Features and advantages of glass-bag filters for cleaning hot, corrosive gases are illustrated and described in 12-pp Bulletin 806. Typical installations are illustrated and methods of cleaning bags covered. Dracco Div., Fuller Co.

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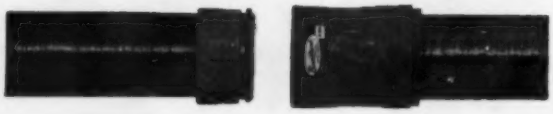

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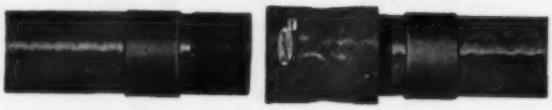

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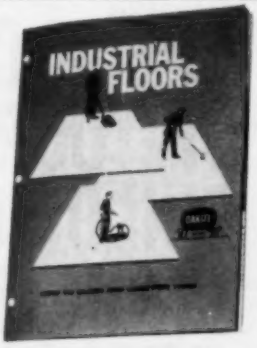

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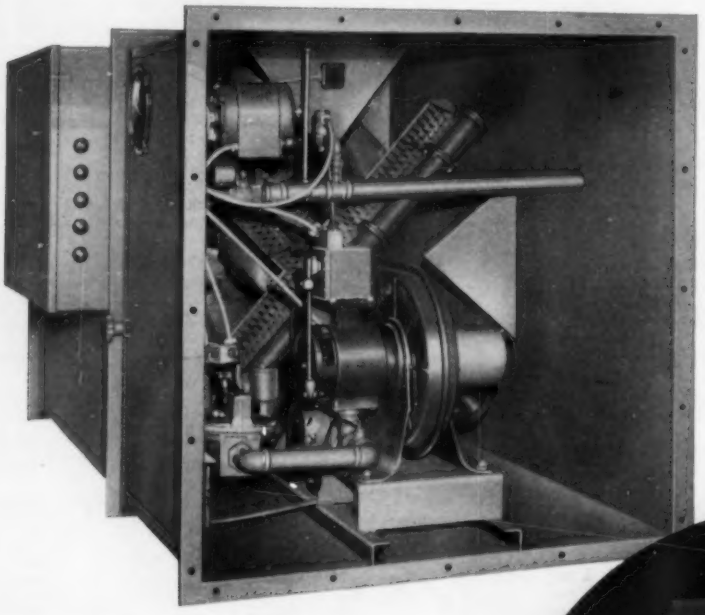

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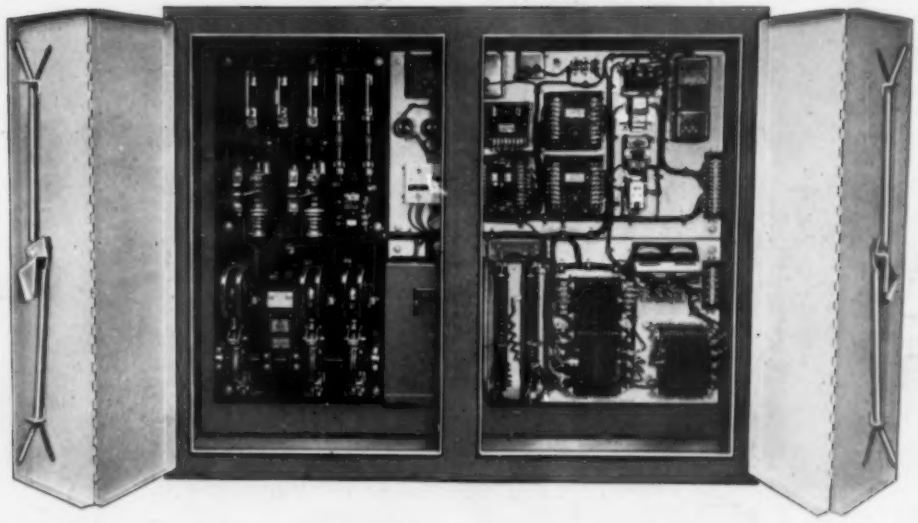

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EC&M's STATA-Hoist Control is available for hoist, bridge and trolley motions

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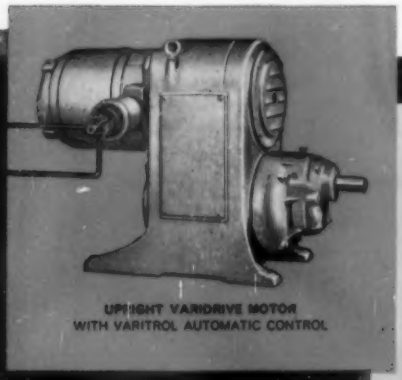

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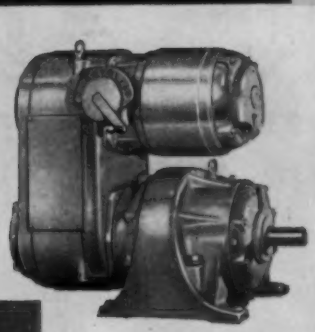

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